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VOL. XXXVI. 1 SEPTEMBER, 1931. PART 3.

Event and Comment.

The Brisbane Show.

QUEENSLAND'S great August festival, the Brisbane Show, was in keeping with the highest traditions of Australian agriculture. The career of the Royal National Agricultural and Industrial Association of Queensland has been marked by exceptional achievement, and its pavilions and its rings have never failed to present a representation of all that is best in a great primary producing State and one of the best stock-raising countries in the world. To many exhibitors success at Brisbane means an endorsement of quality, in beef and dairy cattle particularly, that would be recognised in any show ring in the Commonwealth. The 1931 Brisbane Show, the fifty-sixth of the series, was a crowning display symbolic of the rural wealth of a vast and richly endowed Province. In soil and climate, few countries in the world can offer a greater and richer variety than Queensland. Most, if not all, of the known economic plants, whether requiring temperate or torrid conditions, can be produced prolifically within its borders. Its whole range of climate embraces the winter snows on its southern uplands, the cool conditions of the tableland territories from Darling Downs to Atherton, the dry, clear atmosphere of the western plains, and the humidity of the central and northern tropical coastal regions. Its soils range from the lighter loams to the heavy black alluvia of extensive river flats, and the rich volcanic soils of dense tropical jungles. It is no wonder, then,

that the Brisbane Show, which is really a microcosm of the whole State, should prove an annual revelation of rural richness of which few countries can boast more generous measure. Added to that was the convincing evidence which the manufacturing industries provided of the interlocking of land and secondary enterprises, and the community of interests by which are linked the life and work of town and country.

Departmental Display.

SPACE demands in this issue forbid an extended account of this year's Brisbane Show, but the pictorial record presented will make up for any omission in that regard. Speaking of the Exhibition, the Minister for Agriculture and Stock (Mr. H. F. Walker) expressed especial pleasure with the entries in the stock sections. From an agricultural point of view, he said that the show was equal to any he had seen in recent years. He was greatly impressed with the wide range of products of the highest excellence from the cooler south to the tropical north, and the whole show was a wonderful representation of the industrial life, both primary and secondary, of Queensland. The fine display made by his Department in the Court of Agriculture was especially commendable. The service of science to the farmer was there strikingly illustrated, especially in respect of the biological control of prickly-pear through the agency of which a vast territory would eventually be brought into profitable production. He believed that the true way of overcoming the country's economic difficulties was by greater production, and the Departmental display would convey to the people of Queensland the enormous agricultural capacity of the State and the value of the plans and methods adopted for its successful exploitation.

Agriculture in Queensland.

MR. WALKER, in the course of a notable speech in the Legislative Assembly recently, referred to the outstanding importance of primary production at the present time, especially of the principal commodities in our trans-marine trade, and the development of which through his Department he is doing his best to foster. Besides wool, he said, we have great wealth in cattle, sugar, dairying, wheat, maize, barley, fruit, cotton, tobacco, arrowroot, peanuts, and poultry, quite apart from our immense mineral resources.

Dealing with tobacco growing prospects, he mentioned the scheme launched by the Government under which twenty-five farms have already been established successfully at Mareeba, in North Queensland. This year a further area, embracing 200 to 300 tobacco farms, would be set aside for settlement. The tobacco policy of the Government would extend over the arable regions of the State, and there was no reason why the smoking requirements of the whole of the Commonwealth should not be grown on Australian soil. When it was remembered that £2,500,000 worth of tobacco was imported every year, the economic importance of the successful revival and extension of this industry was immediately realisable. The Mareeba settlers had had the benefit of a practical training under departmental officers and that policy would be continued as far as possible. Each trained farmer would also be in a position to impart his knowledge to his neighbours, and so the good work would go on. The Government planned, continued Mr. Walker, to conduct experimental trials in six widely separated districts, namely, Collinsville, Byfield, Bundaberg, Maryborough, Beerburrum, and Amiens. Every experiment would be carried out on sound commercial lines.

Reclamation of Pear-Infested Lands.

THE MINISTER discussed other directions in which experiments had been carried out, making special reference to the reclamation work proceeding at Palardo, in the Eastern Maranoa district, where nine trial plots had been established. As a result of those experiments, in place of prickly-pear on land which for many

years had been completely unproductive because of the infestation, there were areas growing dwarf Essex rape yielding 14 tons to the acre, and barley yielding 10 tons to the acre, besides other fodder crops and grasses providing equally heavy harvests. "It is not too much to say that we shall see many cattle coming down in excellent condition after having been grazed on that reclaimed country," Mr. Walker added, and then went on to refer to the experiments in pasture improvement continued under his direction in the North and South Coast districts, the results of which would eventually add immensely to the output of the dairying industry and the general wealth production of the State.

Pig-Feeding Experiments.

CONTINUING, Mr. Walker assessed the value of the pig feeding experiments in progress at the Yeerongpilly Stock Experiment Station, the first results of which were published in the August number of this Journal. The published tables gave some idea of the possibilities of the economic utilisation of surplus or low-priced products and the study of them, and all their implications, was to be commended. The low rates ruling for cereals prompted the trials, the object of which was to test the feeding values of barley, maize, and wheat when fed in combination with protein-rich supplements. In his opinion the final results would prove a revelation and would tend to revolutionise the pig industry, ensuring the farmer a fairer return for his enterprise than he received at current market prices. One exporting firm was shipping 50,000 pork carcasses yearly, and the possibilities of the extension of that trade were being fully exploited. With the opening of the new abattoirs on the Brisbane River the exploitation of the export pork trade would, no doubt, be further facilitated.

Efficiency of the Sugar Industry.

COMMENDING the several growers' organisations for their able presentation of the case for the sugar industry before the recent Federal Committee of Inquiry, Mr. Walker said that through their efforts they now had a fair working agreement by which the interests of all concerned were reasonably conserved. Emphasising the efficiency of the Queensland sugar industry, he stated that it now takes only 6.84 tons of cane to make 1 ton of sugar, while thirty years ago it took 10.09 tons. In the same period the acreage yield of raw sugar had been doubled. That fine result had been brought about through the excellent work of the sugar experiment stations, and provided another instance of the great importance of applied science to agriculture.

Dairying Development.

REVIEWING the remarkable development of dairying in Queensland, Mr. Walker reminded the Assembly that its present annual value was within the vicinity of £8,000,000. Production was on an ever-ascending scale, and last year the "peak" for the State was reached with a record output of 93,894,101 lb. of butter. It was not only a record in weight, but also in grade. The value of the exportable surplus actually shipped was £3,326,099; in addition £213,731 worth of cheese was consigned to oversea markets. There was still much to be done in the way of herd improvement, and the increase of production per cow. Science, modern machinery, and economical production were all factors in increased dairy output, and none, so far as his Department was concerned, was being neglected. "When I point out that every additional 10 lb. of butter fat per cow produced from all the cows in Australia would increase the value of the product by something like £2,000,000 per annum, without any extension of existing dairying areas; and that an additional bushel of wheat per acre would mean another £3,000,000, it will be seen what can be done for the primary industries by the application of science," remarked the Minister, whose comprehensive review of present day development in rural enterprise in Queensland, from which only a few points have been taken, covered many other matters of importance to the producer, the consumer, and the State.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director of Sugar Experiment Stations.

PART XVIII.

(c) Mills and Milling Work—*continued.*

CONTINUING with the subject of Mills and Milling Work it should be interesting to give a description of a thoroughly modern and up-to-date sugar-mill. In previous chapters an outline of processes used in the earlier periods of sugar-milling in Queensland, almost from the very start, will be found. For the purpose of comparison, I have selected the latest mill built by the Queensland Government—viz., the Tully—which is situate on Banyan Creek, near the Tully River, North Queensland, between the Herbert and Johnstone Rivers.

I am much indebted to the Engineer of this mill, Mr. W. Pollock, and to the Sugar Technologist of the Bureau of Sugar Experiment Stations, Mr. Norman Bennett, for the following description of this mill.

Tully Central Mill.

The Tully Central Sugar Mill was erected between the years 1923 and 1925 and is situate about 30 miles south of Innisfail. The mill is erected at the foot of Mount Tyson on the site selected by the Royal Commission of 1922, and draws its cane supply from an elongated area.

Tully Mill Buildings.—The various buildings are constructed throughout with massive steel columns braced together with roll-steel joists and lattice girders, the roof is supported with steel principals of sufficient strength to withstand a cyclone. The sides of the building and roof are covered with galvanised corrugated sheet iron and bolted to the purlins and principals with $\frac{3}{8}$-inch galvanised bolts, the roof being further strengthened by having $1\frac{1}{4}$-inch galvanised angle-iron bars spaced equally over the length and breadth of the roof.

Boiler house is 209 feet long by 60 feet wide by 25 feet high.

Passage way between boiler house and crushing house is 20 feet wide.

Crushing house is 214 feet 6 inches long by 60 feet wide and 30 feet high.

Effet house is 181 feet 6 inches long by 60 feet wide by 30 feet high.

Pan house is 99 feet long by 60 feet wide by 60 feet in height.

Sugar room is 165 feet long by 60 feet wide and 30 feet high from the ground floor, the sugar being stacked 4 feet above flood water level.

Cane carrier house is 170 feet long by 30 feet wide and the highest portion is 30 feet and lower portion 20 feet high.

Fitting and machine shop is 65 feet long by 33 feet wide by 20 feet high.

Blacksmith's and truck repair shop is about 40 feet by 40 feet by 20 feet high.

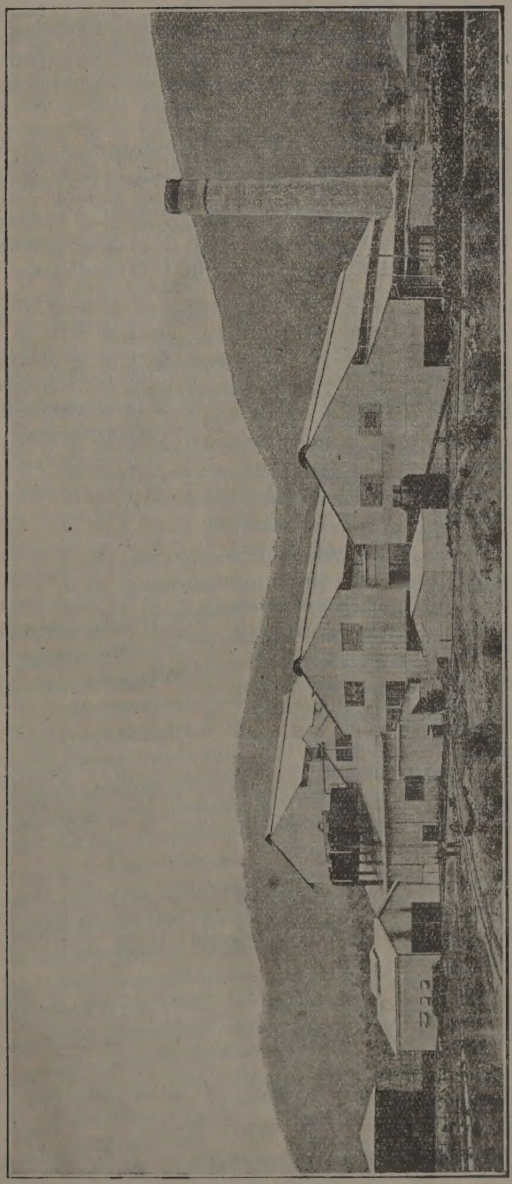


Plate 60.—Tully Sugar Mill.

Tramway system consists of about 35 miles of a permanent railway. The mill is situated approximately in the centre of the railway system. This railway is the standard type used at Queensland sugar mills, being constructed with 40-lb. rails and 2-foot gauge. The various rivers and gullies along the tramline are spanned with wooden bridges of the usual type—piles being first driven into the ground and afterwards fitted with headstocks and hardwood girders, decked with hardwood planks and fitted with handrails.

Water Supply.—The water supply is obtained from the Banyan Creek, which is close to the mill. The pumping is done by two 12-inch motor-driven centrifugal pumps, each motor capable of developing 120 horse-power and delivering 200,000 gallons of water per hour. The quantity of water required for mill purposes per hour in cold weather is 200,000, and in summer about 300,000 gallons.

Cane Supply.—The cane is loaded into steel trucks and hauled into the mill by four 15-ton locomotives; these locomotives can haul on the level railway 110 trucks loaded with an average of thirty hundredweight of cane, and about 21 per cent. is brought to the mill in Government waggons carrying about 10 tons, on the 3 feet 6 inches gauge.

The makers of the locomotives used at the mill are the well-known firm of John Fowler and Company, of Leeds, England. They are four-wheel coupled and fitted with a bogie behind to enable the locomotives to negotiate the railway curves with ease.

Cane Unloaders.—The cane is unloaded at the cane carrier with the David's Patent Unloaders; these unloaders are motor-driven through reduction gears. There are two unloading platforms for the large Government wagons and a tip for the small trucks. This tipping arrangement is worked with a motor-driven reduction gear connected to a quadrant under the tipping platform. The cane trucks are hauled from the weighbridge with motor-driven winches and the trucks are secured to the tipping platform with two chains which prevent the trucks from falling into the carrier when they are being discharged. One truck can be discharged in a few seconds by this means. Empty trucks are hauled away into the various railway sidings by motor-driven winches. The cane carrier is driven with a double cylinder 15 horse-power geared winch.

Levelling Knives.—There is placed half way on the carrier, one revolving shaft; attached to the shaft there are thirty-two cane levelling knives making 350 revolutions per minute; these knives cut the cane and level it down considerably.

At the top of the carrier there is another set of similar knives, these revolve at 450 revolutions per minute, and further cut up the cane as it falls into the Searby Shredder, this shredder revolves at 1,200 revolutions per minute and chops up the cane as fine as may be desired, power is supplied by a motor capable of developing 262 horse-power; diameter of shredder is 42 inches by 72 inches.

From the shredder the cane proceeds to a tandem of four mills independently driven by four piston valve engines 24 inches by 48-inches stroke. The steam pressure to the crushing engines is 100 lb. per square inch. Each mill has rollers 35 inches by 72 inches and is equipped with hydraulic gear and horizontal pushers. Both feed and delivery rolls are equipped with juice grooves and the centres of the mills are 40 feet

apart with the exception of the third and fourth mills, which are 50 feet distant.

Periphery speed of rolls at fifty revolutions per minute—engine speed; first mill 17·4 feet per minute; second mill 17·9 feet per minute; third mill 18·79; and fourth mill 19·69 feet per minute.

Each mill is fitted with hydraulic gear which maintains a constant pressure on the top roller bearings of, say, 400 tons per square inch. Each mill is driven by a separate engine capable of developing 250 indicated horse-power; diameter of cylinders is 24 inches, and length of stroke 4 feet and fifty revolutions per minute.

Crane.—There is a 20-ton electrically driven crane that travels over the mills and engines and is used for lifting the rollers, &c., when required.

The mill building is 215 feet by 60 feet span and the cane carrier shed 149 feet by 30 feet span.

The crushed bagasse is delivered to an inclined dragtype carrier, which discharges into a cross conveyor and thence to the conveyor over the furnaces. The boiler station is thus parallel to and adjacent to the crushing plant, necessitating short main steam lines.

Treatment of Raw Juices.—The expressed juices from the first and second mills are led to the juice tanks where the necessary lime is added, the liming is done automatically so that when the mills stop, the lime stops (·473 tons lime used to 1,000 tons cane).

The juices are then pumped through the superheaters into the continuous subsiders at a temperature of 214 deg. Fahr. The juices from the third and fourth mills are used as maceration on the first and second mills and approximately 47 per cent. added water is applied to the third mill as maceration. All maceration fluids are pumped on to the bagasse as it leaves the top and delivery rollers of each mill.

Muds.—The manner of dealing with the mud is what may be called a semi-Petree Process. The mud from the first subsider goes into the second juice tank and is mixed with the second mill juice, the second and third subsider muds go to the third mill juice tank and are pumped on as maceration to the cane mill.

There are three subsiders of a capacity of 8,000 gallons each, the first subsider deals only with the first cane mill juice and the second and third deals with the second mill juice. There are four juice heaters of 708 square feet of heating surface each, and one maceration water heater of 490 square feet heating surface. The temperature of the juice is raised to 214 deg. Fahr. and the temperature of the maceration fluids for the first mill 140 deg. Fahr. and the second and third mills 158 deg. Fahr.

Effets.—There is one set of quadruple effets or evaporators with 20,000 square feet of heating surface. Pressure of steam in the first calandria is 3·5 lb. and 6 inches of vacuum in first vessel, and temperature of 202 deg. Fahr.; in the second vessel 12 inches of vacuum and temperature 188 deg. Fahr.; in the third vessel 20-inch of vacuum and temperature 162 deg. Fahr.; in the fourth vessel 28 inches of vacuum and temperature 100 deg. Fahr. Steam is only admitted to the first calandria and the steam from the boiling juice of the first pot enters the second calandria and boils the juice in the second pot,

and the steam thus generated enters the third calandria and boils the juice in the third pot, and the steam from the third pot juice enters the fourth calandria and boils the juice or liquor in the fourth pot to 65 deg. Brix. This heavy liquor is then pumped from the fourth pot to storage tanks on the vacuum pan floor.

These effet vessels receive their supply of clarified juice direct from the top of the subsiders.

The boiling-house is arranged to work on the gravity system. The pan floor is 40 feet above ground level.

Vacuum Pans.—There are four vacuum pans situated in the boiling-house, two are of the calandria type being 12 feet in diameter, of 5,500 gallons capacity, and 1,375 square feet heating surface. One coil pan 12 feet diameter of 5,500 gallons capacity, and 1,100 square feet of heating surface. One coil pan 10 feet diameter of 3,500 gallons capacity and 750 square feet heating surface. There are four massecuites boiled—namely, A, AB, B, C.

A massecuite is boiled from 100 per cent. liquor, AB is boiled from 37 per cent. A massecuite and 63 per cent. massecuite from A syrup, B massecuite is boiled from 29 per cent. A massecuite and 71 per cent. massecuite from AB syrup. C massecuite is boiled from 18 per cent. A massecuite and 82 per cent. massecuite from B syrup.

The average vacuum on the pans is 26 inches, temperature of 126 deg. Fahr. All syrups are diluted to 67 Brix.

Crystallisers.—All massecuites when discharged from the pans go into the crystallisers, of which there are eight—7 feet 6 inches in diameter by 25 feet long fitted with stirring gear to keep the massecuite in motion. The crystallisers discharge into a cooler placed above the fugals, which is also fitted with stirring gear motor driven.

There are sixteen Watson-Laidlaw centrifugal machines motor driven, eight of these (40 inches by 24 inches) deal with what is called number one sugar, and the other eight 40 inches by 20 inches deal with the C sugar or low grade; the molasses from this low-grade sugar is used with the bagasse as fuel. The various syrups from the No. 1 sugar are returned to the vacuum pans and reboiled as previously stated. The 40 inches by 24 inches fugals are bottomless and self-discharging. The sugar when dried falls into a screw conveyor under the fugals, and is conveyed by this means to the sugar elevator and passed through a sugar drier into the sugar bin; on the bottom or outlet of this bin is placed the weighing machine to which are attached the sugar bags, and the bags when filled and weighed drop on to a conveyor and are then taken to the sewing machine which closes the bags and allows them to drop on to the bag-stacking machine, which conveys the bag of sugar to the railway wagons. The bags of sugar are afterwards conveyed to Townsville wharf by rail and shipped to the Sugar Refinery or overseas as required.

Mill Capacity.—The average crushing rate for the mill is 65·37 tons per hour, and it takes 6·736 tons of cane to make 1 ton of sugar.

Power.—All the auxiliary machines, pumps, &c., are motor-driven with the exception of the cane carrier steam winch. Electric power is derived from three Crompton generators driven by Bellis-Morcom steam engines. Power of generators is rated at 437 K.V.A. three phase alternating current 415 volts 608 amp, and two sets of Vickers-Petters

crude oil engines to supply light and power to the township of Tully, there being 200 consumers. Each set develops 75 horse-power 40 K.W. 3 phase alternating current 415 volts.

Boilers.—Steam is supplied by six John Thompson's water tube boilers, having 4,250 square feet of heating surface each.

Workshops are fully equipped with the latest and up-to-date machines, which enable repairs to be done expeditiously.

The following additional particulars of the Tully mill have been supplied by Mr. Bennett, the Sugar Technologist to the Bureau:—

"The sugar room is 80 feet long by 60 feet wide and 26 feet high. The room provides ample space for sugar storage and is built on concrete foundations, the floor itself being of tongue and grooved boards in order to prevent moisture reaching the stacked sugar from underneath. Two portable bag stacking machines are provided for easy storage of the sugar, if necessary.

"The water supply for the mill is drawn from a specially constructed well on the creek side. Two Kelly and Lewis centrifugal pumps capable of supplying 300,000 gallons of water per hour are connected by pipe line to the mill. The pumps are electrically controlled from the switch board in the power-house.

"In addition to the mill buildings proper, ample barrack accommodation for the workmen employed, staff houses, offices, and laboratory have been provided for. The actual dimensions of the buildings are:—

Milling-house—214 feet by 60 feet.

Evaporating-house—214 feet by 60 feet.

Boiling-house and sugar-room—214 feet by 60 feet.

Boiler and power-house—207 feet by 60 feet.

Carrier shed—170 feet by 30 feet.

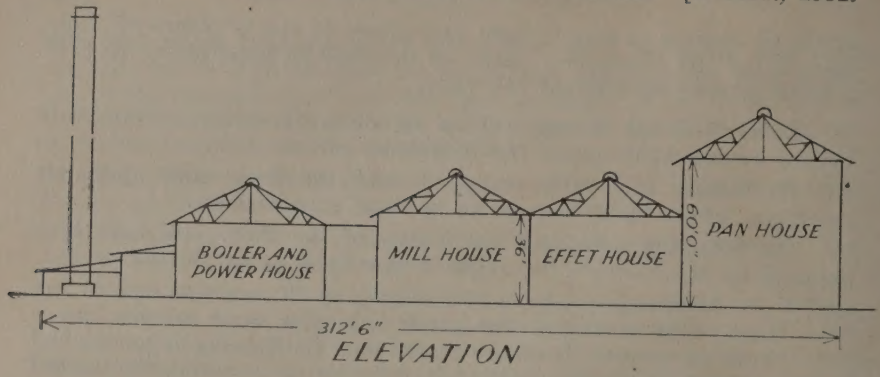
A layout of the plant is attached.

"The mill, which was originally designed to crush a tonnage of 6,000 tons per week for a twenty-five-week season, has far exceeded that capacity.

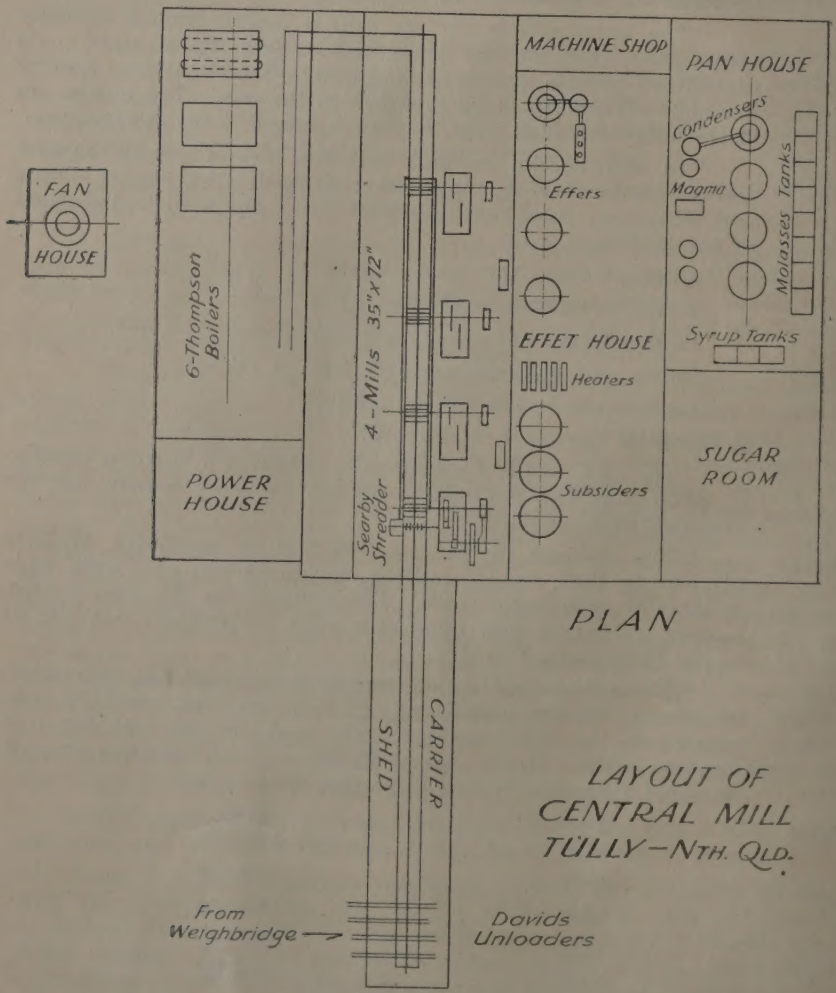
"The contract for the erection was let to Messrs. Walkers Limited, in 1923, and the milling machinery and pans were made in their Maryborough works. The contract for the juice pumps, heaters, subsiders, and quadruple effet evaporators was sub-let to the Bundaberg Foundry.

"The actual construction work at the mill site was undertaken by Messrs. Barbat and Sons, and the first trial crushing commenced on the 5th November, 1925, and concluded on the 16th January, 1926. A tonnage of 32,075 tons of cane was treated. Seasonal tonnages crushed since that date were—

Year.	Tons.
1926	148,006
1927	202,856
1928	230,424
1929	207,949
1930	215,022



ELEVATION



PLAN

LAYOUT OF CENTRAL MILL TULLY—NTH. QLD.

PLATE 61.

"During the 1930 season, the average tonnage rate was 65 tons of cane per hour, equivalent to a weekly crushing of 8,600 tons of cane in a 44-hour week or 1,250 tons of sugar.

"Actually, the crushing plant has attained a rate of 75 tons of cane per hour, and working overtime, has crushed on two occasions last season, more than 10,000 tons of cane in a week's run. The hourly tonnage rates during these weeks were 68·5 and 67·25 tons of cane per hour.

"The mill manufactures a sugar of 98·5 pol., using lime defecation for clarification in conjunction with the Petree process.

"The syrup is concentrated to 68 Brix in the effets. Little maceration is added and the mill has been successful in operating the entire plant without the addition of surplus fuel other than molasses.

"A four massecuite and magma grain system of sugar boiling is in operation—commercial sugar being obtained from the three richer boilings. The low-grade boiling produces the magma seed which is used for foundation on the higher grade massecuites and final molasses of this final product, some 3,000 tons are burnt as fuel in the season."

It has been stated that a company was formed to grow cane in the Tully district as early as 1866, and that a mill was actually built on the Murray, the brick foundation of the buildings being all that is left. The machinery and materials were supposed to have been taken to Mackay and re-erected as the Alexandria Mill.

Mr. James Tyson, whose name is well known in Australia, also intended to grow sugar at the Tully, but the anti-black labour policy of the Griffith Government caused him to abandon the enterprise. The name of Mount Tyson, however, still remains to connect him with the district.

[TO BE CONTINUED.]

TO NEW SUBSCRIBERS.

New subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some new subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and new subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

TILLAGE AND CULTIVATION.*

By H. W. KERR.

Why do you plough? Surely, our farmer will answer me, you are not seriously asking such a question; is it not a fundamental principle that ploughing and cultivation are absolutely essential to successful agriculture? Who would attempt to grow a crop of cane without recourse to modern tillage implements? But let us think back a little. Is it not also a fact that many of our best lands produced their heaviest crops without the aid of implements of any kind? Most of us have seen something of the results which followed the first planting of virgin scrub lands. Plant crops of 60 tons per acre were frequently harvested under these conditions, and three or four heavy ratoon crops followed, with nothing more than a light hoeing to scratch out a few weeds between the stumps and cane stools. Yet many of these cane lands to-day, even with the aid of modern cultivation implements, are not producing more than one-half of the tonnage of which they were originally capable.

Perhaps if we should study the differences between our old and new lands we should get some clue as to what our virgin lands possessed which is now lacking. And if it lies within our power to supplement the missing factors or conditions, then we should be able to restore something of the initial high-producing power of our soil.

The question of supply of available plant-foods is undoubtedly very important. This has been discussed elsewhere, and it has been shown that, without the addition of heavy applications of artificial fertilizers, the available plant-food supply in the soil becomes rapidly depleted. But there is something more than this required; for the application of even excessive dressings of fertilizer alone will restore but a fraction of the diminished crop returns, particularly if our cultivation methods are inadequate. There must then be something in the physical condition of our old soil which requires modification in order to restore its production power.

Now we probably remember quite clearly the excellent condition of tilth which characterised our virgin soil. The dense scrub growth was the natural protector of the soil in which it flourished. The heavy cover of foliage guarded the surface soil from the pounding action of torrential rains; the roots of the trees penetrated to a great depth, and the finer rootlets opened up the soil to allow free entry of the rain which fell, and stored up an adequate supply of moisture for the luxuriant plant-growth. Further, the cover of vegetation guarded the soil against the drying action of the sun and winds, and thus conserved the soil moisture for use by the natural flora. The decaying vegetation maintained in the soil an abundance of humus—that substance so important in providing an open-soil structure and increasing the water-holding capacity of the soil.

What has happened since the scrub was removed? First of all, a modest cane hole was all that was necessary to ensure the establishment of the cane crop, provided that the rainfall was reasonably good. The modified conditions made available to the crop an abundance of plant-food which normally supplied the scrub vegetation. This was effected at the expense of the soil humus, which, under our agricultural system

* Paper read at the Second Annual Conference of the Queensland Society of Sugar Cane Technologists, in March, 1931.

and our favourable climatic conditions, decomposes rapidly. Our tests have shown that under conditions of optimum soil moisture 3 tons of humus per acre may be lost to the land during a brief summer season. It would thus be absolutely impracticable, under intensive cultivation, to attempt to maintain the initial humus content of our soil.

Due to the beating of heavy rains to which our soil was now exposed, and the trampling of man and beast, the soil became packed and consolidated. The air and moisture supply, so essential to the crop, did not enter as readily; and with the passing of the first flush of fertility and heavy crop yields it became desirable to get the land under the plough. A good seed-bed was, in general, readily prepared, and again heavy crops were harvested, under favourable climatic conditions.

However, with the progress of time and under continued cane cultivation the soil seemed to lose the "life" which it earlier possessed; and only the intensive use of implements and adequate fertilizer applications can now restore something of the earlier productivity of the land.

Let us now examine our soil carefully in the field. We will generally find after, say, a second ratoon crop that the soil is firmly compacted. The loss of humus has made it more difficult to retain the favourable open structure of the soil, and the continued use of implements has further assisted in destroying the granular conditions of the soil crumbs. The heavy rains to which the land surface is exposed complete the work of driving the individual soil particles into a compact mass. If we should examine the soil at the depth to which our implements work, we would probably find (except in the case of sandy soils) that a definite plough-sole has been created, due to the packing action of that implement, unless definite steps have been taken to break it up.

We can now understand what we should aim at in all our farm cultural operations, and if we should make a close and careful study of our problem, we could probably devise a system whereby the faults which have arisen can be corrected.

Probably the most important aspect of an unfavourable soil condition is its relationship to the water economy of the crop. We know that a compact soil does not absorb and hold water as freely as does one with an open structure. Further, the presence of a hardpan in the soil prevents the free percolation of the excess rainfall of the wet season into the subsoil, and, by inhibiting the root development of the crop, forces the plant to rely on the scanty supply of the surface soil for its requirements.

All cultural operations should be carried out, then, with these facts clearly in mind; and we find that we can bring almost every phase of tillage under one of two headings—

(*a*) The production and maintenance of such a set of conditions as will allow of the free entry of as much moisture as possible into the soil.

(*b*) The retention of this moisture for use by the cane crop.

Because of the high water requirements of the crop, cane culture is effected most successfully in regions of abundant rainfall, or in areas where heavy and frequent applications of irrigation water are possible. Experiments have shown that in the production of 1 ton of cane about 30,000 gallons of water are drawn from the soil by the cane plants.

Therefore, for a 30-ton crop to be produced, the soil must be able to supply 36 acre-inches of water to the growing crop. Expressed in another way, each stool of cane in that acre of land will evaporate from its leaf surfaces no less than 150 gallons of water during the cropping period. When due allowance is made for the rainfall lost by surface run-off and subdrainage in times of heavy rain, and by surface evaporation from the moist soil, a rainfall considerably in excess of 36 inches will be required in order that our 30-ton crop will be possible. Even in districts where the rainfall exceeds twice this amount, the fact that the poor distribution during the wet season often causes excessive losses by drainage may preclude the effective use of more than 20 inches of rainfall by our crop.

We know too well that partial or complete failure of our cane crops is generally associated with an inadequate moisture supply in the spring months. During these periods of drought, crop growth is at a standstill despite favourable growing temperatures. Would it be possible to store some of the wet season's moisture in the soil for use by the crop in times of drought? If so, we might be able to combat these ills, and maintain favourable growing conditions despite the season. The solution of this problem is the secret of successful cultivation under these conditions, and in attempting to adopt a favourable system we would do well to consider some of the principles which are employed in regions where so-called "dry farming" is practised. Certain methods have been devised in areas where the rainfall is deficient whereby a supply of soil moisture is stored up prior to seeding; and in some instances good crops of grain have been grown to maturity without their having received a drop of rain during the growing period. Let us examine some of these principles, and see how far they may be applicable under our conditions.

The soil is our natural reservoir in which the water is stored for future use. It is evident, then, that the storage capacity should be large in order that the supply will be adequate. Therefore, we must see that our soil is brought to such a condition that the rain will be readily absorbed as it is received and that we have a good depth of open absorbent material. This suggests that we should plough our soil deeply when breaking up the land after the previous crop has been harvested. Wherever the soil is of good depth this is found to be an excellent practice. Deep tillage is, indeed, the secret of successful crop growth under semi-arid conditions. But, where the surface soil is, say, only 6 inches deep, ploughing to 10 inches might spell crop failure, for to bring to the surface 4 inches of "raw" subsoil, particularly when it is clayey, might completely ruin the tilth of the surface soil, besides adding a mass of material deficient in plant-food and humus. Many a farmer has had this experience, and has wrongfully condemned deep ploughing. In a case such as this it is desirable to deepen the surface soil, but this must be done judiciously—a little at a time.

Now, the value of the subsoil plough in creating a condition favourable for the ready absorption of rain water cannot be over-estimated. It is of immense assistance where a shallow soil is underlaid by a stiff subsoil or where a hardpan exists in the soil either naturally or due to the packing action of implements. The efficient subsoil plough does not bring the subsoil to the surface but simply cuts a gash in the compact substratum which allows of the free passage of the rain water from the saturated surface soil to the lower depths of our reservoir. It also

provides a passage-way for the roots which will penetrate to these depths and make this moisture available to our crop in time of need. It is well known that cane roots are found at depths of 3 and 4 feet below the surface, provided they are not shut out by the presence of an impervious hardpan or subsoil. Unfortunately, the subsoiling implements which one commonly sees in this country are not correctly constructed. They are generally too broad at the point, and require tractor power to draw them through the subsoil. An efficient plough should be no more than an inch in width at the point, and the cutter or blade should not exceed one-half inch in thickness. Such a subsoil plough can be drawn by two horses, and will cut a gash from 10 to 16 inches in depth below the bottom of the furrow. It is customary to follow with the subsoiler in every second furrow ploughed with our mouldboard or disc plough. Subsoiling is of no value in a sandy subsoil, as one might expect; but for heavy soils its value in allowing of the free penetration of water and air into the substrata cannot be over-estimated. After this treatment has been given it will be found that a hardpan rapidly disintegrates.

A soil prepared in this way may be capable of holding up to 25 per cent. of its weight of moisture; hence it will be seen that to a depth of, say, 30 inches over 7 inches or about one-fifth of that required by our 30-ton crop may be stored. A soil inadequately prepared may hold only 3 inches of available water in its surface foot.

Having provided for the uptake of this valuable moisture, we must guard against its loss so far as we are able. The chief avenues of escape are by surface evaporation and weed growth. When a soil is compact, and the surface becomes dried out, moisture is drawn up by capillary action from lower depths, and is readily lost from the land. Now, it is found that if the soil surface can be kept in the form of a loose dry mulch the soil capillaries are effectively broken, and evaporation losses are minimised. Again, weeds and grasses require water for growth equally as much as does cane, and every gallon diverted for their use means so much less for our crop; hence the necessity for intensive surface cultivation either with the discs or scarifiers after each rain to eradicate weed growth and restore the surface mulch. It has been found that a 2-inch mulch is quite sufficient in this respect, and deeper cultivation during the cropping period may even be detrimental; for the majority of the feeding roots of the crop are concentrated in the surface soil, and it is from this layer that the crop draws the major portion of its plant-food. But if heavy rains have compacted the surface soil to such an extent that the absorption of further rainfall will be seriously hampered, deeper cultivation, though it may cause a certain amount of root-pruning at the time, will be of ultimate benefit. Deep working of the interspaces is frequently called for in our Northern climate when the crop is young.

The time at which these operations should be carried out is of the greatest importance. All our efforts must be directed towards the production of a favourable medium for free root development and water absorption, as was our scrub soil in its virgin state. At that time the soil possessed the desirable granular or crumby structure which is characteristic of a soil "in good heart." Paradoxical though it may seem, the more one works the land in an attempt to induce this structure, the worse becomes the permanent physical condition of the land; and it grows increasingly more difficult to restore a good tilth under continuous cultivation. A soil when worked at the right moisture content

mellows down readily, but if worked either too wet or too dry, the soil becomes either puddled or reduced to dust, and our desirable granular structure is lost. We should aim, therefore, at carrying out all operations when the soil is in the proper moist condition. Of course, this is not always possible, particularly when spring ploughing; however, a little care and forethought will often show that it is possible to achieve this to a very considerable extent. With a light-textured soil liberties may be taken, but on heavy land failure to work the soil just at the right time is fatal, and it may take years to wipe out the damage which can be caused by ploughing a heavy soil a day too soon.

The season at which land should be ploughed is a question which has received all too little attention. How frequently one sees a grower breaking up his hard soil in the months of June and July in preparation for a spring plant! The surface is often covered with trash and weeds which have seeded freely. The ploughing and reploughing of the land result in a considerable loss of moisture at a season when our rainfall is notably deficient. Under the cool and dry conditions, the crop residues do not rot well, and at planting time much undecomposed material is found in the soil. Frequently it is necessary to wait for spring rains before planting; and, knowing as we do so well the capricious nature of the weather at this season, is it any wonder that the crop is frequently a failure?

My observations, covering the majority of the Queensland cane districts, show that in general an autumn plant yields the most successful crop; and I would present for your criticism a system of land preparation which I believe could be studied with advantage, particularly in its relationship to Central and Southern Queensland conditions.

It has been pointed out that the months from August to December cover the critical period in the growth of the crop. A crop that receives a good start in life will finish well, except under unusual circumstances. Therefore, we should aim at starting off the crop under the best of conditions. We have seen that a 30-ton cane crop requires about 36 acre-inches of water during its growing period, and in the districts named we cannot, in general, expect that amount of moisture to be absorbed by the soil during the growing season, and used by the crop. Hence it would be advantageous if we could store up a supply of soil moisture in advance of the planting season, to carry the crop through the dry spring months. It will, then, be necessary to prepare our land in advance of the wet season. When the last ratoon crop has been harvested the old stubble should be ploughed out immediately, and the surface of the land thoroughly disced. This will create a good surface mulch and chop up the trash and other crop residues to some extent. A good deep ploughing will then turn under the vegetable matter, and give it a chance to decompose completely before planting time. The presence of the loose surface layer of soil will ensure good contact with the substratum. Any weed seeds present at this time will probably be destroyed if buried deeply, or on germination subsequent surface discing will control them.

Where the subsoil is compact or a hardpan exists, the use of the subsoil plough should follow. The discs and harrows will help to reduce the clods of soil, and the roller may also be used to advantage for this purpose, as well as to destroy large air spaces, which will later hamper capillary rise of moisture. Conditions should then be favourable for the absorption of the rain which falls during January, February, and

March, and the deep tillage will assist materially in preventing water-logging of many soils with imperfect drainage. Some of the Mackay soils are of this nature, due to the presence of an impervious hardpan at a depth of from 10-14 inches.

Such a fallow will generally do much towards mellowing the soil structure, particularly in the case of heavy soils. After periods of rainfall the surface of the land should be disced to break up the caked surface, and also to control weed growth. At the conclusion of the wet season the land should require a minimum of working to put it in condition for early planting. In planting at this time, when the soil is still warm, the sets will germinate readily, and the crop will become established before the advent of the winter months. Should a dry period follow, the crop roots will penetrate freely into the subsoil, and follow up the moisture supply which has been stored there. Instead of a shallow-rooted crop, then, we will have one which can draw its moisture from the full depth of soil and subsoil, and which will stand up well to droughty conditions.

Other things being equal, it will be found that a good ratoon crop follows more frequently on a good than on a poor plant crop; for the heavier growth of stubble produced by the plant crop ensures a better start for the ratoons. Hence, by providing conditions favourable for the plant, we are automatically assisting the ratoons. The latter get their start in life at a time when the rainfall is generally scanty. Therefore it is desirable that they should make best use of any moisture which remains in the soil at the time of harvesting the mature cane.

We have seen that the best way to conserve soil moisture is to break the soil capillaries by creating a surface mulch of loose soil. In this regard, the discs are again of great value. They should be drawn across the field—preferably in two directions at right angles—as soon as the trash has been burnt off after harvesting. Besides providing a surface mulch, they tend to destroy the uppermost "eyes" of the stool, and encourage the ratoon shoots to come from below. In this way the stool is kept well in the ground, and the shoot roots which then develop will have access to any available soil moisture.

The advisability of ploughing away from the stools in ratooning is one which can be decided only after a study of the local conditions at the time. If the soil is packed and dry, and would break up into clods which could not be worked down to a good tilth, it is probable that ill-effects would follow in the event of a subsequent dry spell. If, on the other hand, moisture conditions are favourable, ploughing away is highly beneficial. It removes a mass of old roots and dead portions of the stool, and on working the soil back again a mellow bed is again provided for the development of the new roots. Incidentally, such a furrow as is produced in this way is ideal for receiving the application of fertilizer which the ratoons will need, and the earlier they receive it the better use they will make of it.

WIRE-NETTING FOR THE ROAD.

When going over paddocks with car or truck in wet weather, take a small roll of wire-netting along. When negotiating muddy places lay the wire-netting in position. It enables the wheels to grip firmly, thereby saving time and temper, a lot of which is often lost when chains have to be put on. It is also useful on roads where there are only small sections in a bad state, as it is light and easily handled.

PYRETHRUM CULTURE AS A SIDE LINE.

The value of Pyrethrum flowers as an insecticide has long been recognised, and the varieties grown in Dalmatia and the east coast of the Adriatic Sea are of greater toxic value than other species grown elsewhere. Cultivation of the Dalmatian variety was begun in Japan in the 'nineties, since which time Japan has supplied the major part of the world's demand.

Pyrethrum flowers form the base of many insecticides used in medical entomology, but the discovery of recent years of the toxic principle—namely, the Pyrethrins—has led to the manufacture of a water soluble extract of Pyrethrum, commercially cheaper, and for which, it is anticipated, there will be a big demand in the near future. This extract of Pyrethrum is of particular value for agricultural use against caterpillars, ants, cucumber beetles, cut worms, leaf hoppers, and other agricultural pests. The insecticide first paralyses and then kills, causing no damage of any sort to the host plant; this is of special value in such sprays. Poisonous sprays have been responsible for loss of life and the confiscation of many tons of edible products rendered thereby unfit for human consumption. This is all avoided by the use of Pyrethrum products.

In view of the possibility of steadily increasing demands, it is hoped that Australia will not be found wanting in an endeavour to grow Pyrethrum flowers and supply some of the world's markets. If a Pyrethrum industry could be developed here in Queensland, what a wonderful boon it would be to struggling agriculturists, and in view of such possibilities I trust that this matter will receive, from prospective growers every possible consideration.—R. HAMLYN-HARRIS, City Entomologist.

QUEENSLAND WEEDS.

WHITE ROOT *(LOBELIA PURPURASCENS)*

By C. T. WHITE, Government Botanist.

Description.—A creeping herb from a few inches to a foot high according to situation, and possessing numerous white underground runners (stolons). Stems very slender. Leaves ovate or ovate-lanceolate in outline, margins toothed, ½ to 1 inch long, ¼ to nearly ½ inch wide, often purplish underneath. Flowers white on very slender stalks, as long as or more often considerably longer than the leaves and recurved as the ovary develops into the fruit; corolla white, 5-lobed, the three lower lobes much longer than the two upper ones. Fruit globose about ¼ inch in diameter when fully developed; seeds numerous, very small and covered with short hair.

Distribution.—A native of the eastern States of Australia.

Common Name.—White Root is the only local name I have heard applied to this plant.

Botanical Name.—Lobelia, after Matthias de L'Obel (1538-1616), an early Flemish botanist; *purpurascens,* Latin referring to the leaves often being purplish beneath.

Properties.—The genus *Lobelia* is a large one and is known to possess several poisonous species. Bailey (Weeds and Suspected Poisonous Plants of Queensland) records it as very poisonous to stock. Generally speaking, stock do not seem to eat the plant, or at least not to any extent. Cases have been reported to me of pigs having become sick after eating the white underground runners.

Eradication.—The weed is a pest very difficult of eradication and control in cultivated land, particularly in pineapple plantations. The white underground roots enable the plant to get among the pineapples where its eradication is almost impossible. The underground parts multiply to such an extent as to rob the surrounding soil of much moisture and plant food, with the result that the pineapple plants cannot thrive. With ordinary cultivation every little piece of the plant broken off forms a fresh plant by itself. The object with weeds such as this must always be to regularly check the green growth above the ground so that the underground parts must eventually become exhausted by repeatedly sending up fresh shoots and getting no nourishment in return. After cultivation as many of the white roots as possible should be raked out and destroyed. No experiments regarding eradication by sprays have been carried out, but, generally speaking, with plants with underground means of propagation such as this sprays are not very satisfactory and render the ground sterile for some time.

Plate 62.—White Root (*Lobelia Purpurascens*).
1. Plant, natural size. 2. Flower, enlarged.

CLIMATOLOGICAL TABLE—JULY, 1931.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature. Means.		Shade Temperature. Extremes.				Rainfall. Total.	Rainfall. Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	30·03	80	66	83	20, 27	54	9	43	5
Herberton	..	73	47	81	9	34	8	50	6
Rockhampton	30·11	76	51	84	26	41	9	43	6
Brisbane	30·11	69	50	81	28	42	17	178	6
Darling Downs.									
Dalby	30·14	66	39	82	26	28	14, 17	96	6
Stanthorpe	..	58	34	71	26, 27	21	30	195	7
Toowoomba	..	60	40	78	26	28	15	242	7
Mid-Interior.									
Georgetown	30·02	84	53	90	24	40	7	0	..
Longreach	30·12	74	42	87	25	31	7	0	..
Mitchell	30·16	65	37	82	25, 26	26	17	106	3
Western.									
Burketown	30·06	82	55	90	28	43	8	0	..
Boulia	30·12	75	45	92	25	35	7	0	..
Thargomindah	30·14	63	43	82	25	32	31	56	3

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1931 AND 1930 FOR COMPARISON.

Divisions and Stations.	Average Rainfall. July.	Average Rainfall. No. of Years' Records.	Total Rainfall. July. 1931.	Total Rainfall. July. 1930.
North Coast.	In.		In.	In.
Atherton	1·01	30	0·12	1·89
Cairns	1·59	49	1·27	2·95
Cardwell	1·36	59	0·55	1·29
Cooktown	0·99	55	0·43	0·99
Herberton	0·79	44	0·50	1·16
Ingham	1·50	39	1·11	1·09
Innisfail	4·68	50	1·90	5·84
Mossman Mill	1·27	18	1·01	0·70
Townsville	0·62	60	0·08	0·31
Central Coast.				
Ayr	0·69	44	0	0·18
Bowen	0·91	60	0·08	0·20
Charters Towers	0·63	49	0·01	0·08
Mackay	1·63	60	0·31	0·30
Proserpine	1·38	28	0·68	3·10
St. Lawrence	1·27	60	0·17	0·60
South Coast.				
Biggenden	1·34	32	0·37	1·41
Bundaberg	1·80	48	0·64	1·32
Brisbane	2·22	80	1·78	1·25
Caboolture	2·14	44	1·60	1·56
Childers	1·68	36	0·72	1·70
Crohamhurst	2·88	38	1·64	3·33
Esk	1·97	44	1·51	2·43
Gayndah	1·44	60	0·98	0·86
Gympie	2·13	61	0·78	1·54
South Coast—continued:				
Kilkivan	1·61	52	1·02	1·40
Maryborough	1·86	59	0·81	0·96
Nambour	2·67	35	1·50	1·60
Nanango	1·67	49	0·65	1·51
Rockhampton	1·42	44	0·43	1·27
Woodford	2·35	44	1·86	2·00
Darling Downs.				
Dalby	1·73	61	0·96	3·02
Emu Vale	1·54	35	1·60	1·49
Jimbour	1·55	43	0·84	1·60
Miles	1·63	46	0·84	1·12
Stanthorpe	2·03	58	1·95	1·93
Toowoomba	2·03	59	2·42	2·55
Warwick	1·82	66	1·72	2·99
Maranoa.				
Roma	1·42	57	1·28	1·28
State Farms, &c.				
Bungeworgorai	1·32	17	1·24	0·90
Gatton College	1·42	36	2·21	0·96
Gindie	0·91	32	0·55	0·55
Hermitage	1·70	25	1·82	2·08
Kairi	1·18	17	..	1·52
Mackay Sugar Experiment Station	1·39	34	0·19	0·28

GEORGE G. BOND, Divisional Meteorologist.

DISEASES OF THE PIG.*

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

[*Continued from the July issue.*]

PART VI.

In the preparation of information dealing with Diseases of the Pig, an endeavour has been made to describe in the simplest language possible the various conditions, abnormal and otherwise, associated with the incidence or appearance of disease in swine. The suggested preventive measures and methods of treatment are such as may be successfully carried out by any careful farmer, excepting only in cases where the services of a qualified veterinarian are advised, and in these cases the best methods to follow will be suggested on the spot by the surgeon himself.

The pig is notoriously a bad patient and a difficult animal to handle when indisposed, hence great stress has been laid throughout this treatise on the necessity of preventive measures, for prevention is not only much better than cure, but is invariably less costly and a great deal more satisfactory.

In dealing with methods of treatment and the engagement of qualified aid, it has been realised there are numerous difficulties in the way, because Departmental officers or practising veterinarians are not always immediately available in town or country districts. Again, therefore, we stress that prevention is better than cure, and we might even qualify this further by adding prevention is more necessary than cure.

Mr. Shelton's bulletin, representing as it does much labour and the fruits of careful study and observation, is a welcome contribution to current pig literature.—EDITOR.

DIARRHŒA OR WHITE SCOUR IN YOUNG PIGS.

OF all the troubles to which sucking pigs are subject, no ailment is more severe in its action, or more disastrous in its effect than Diarrhœa or, as it is more frequently referred to, White Scour. The disease referred to very often as Yellow Scour is of a similar, if not more serious nature. Answering an enquiry recently regarding the trouble referred to as "yellow scours" and which also is an acute trouble, Mr. C. J. Pound, Government Bacteriologist, stated that white and yellow scours are phases of the same trouble and are invariably caused by the Bacillus coli communis. The apparent variation in virulence of the infection is largely dependent upon the susceptibility of the individual attacked and the character of the environment. Diarrhœa in itself is not necessarily a disease, but is merely an affection of the bowels. The more persistent trouble, white scour, however, is classified as a disease and is often a premonitary symptom of disease involving organs other than the stomach and intestines.

* The typescript and illustrations of the Farmers' Bulletin on Diseases of the Pig have been submitted to the Chief Inspector of Stock, Major A. H. Cory, M.R.C.V.S., Department of Agriculture and Stock, Brisbane, Queensland.

Copies of the Bulletin when completed may be had gratis on application to the Under Secretary, Department of Agriculture and Stock, Brisbane, Queensland.

In the compilation of this paper the writings of recognised authorities in other States and other parts of the world have been drawn on, and the assistance thus received, also that freely given by other Departmental officers, is acknowledged gratefully.

The Food Supply at Fault.

It is well to note that, when a sow farrows she has an ample supply of milk (or she should have if she is in normal condition) for her progeny, and they soon reduce her normal supply; but some breeders, in their enthusiasm, and with a desire to give her a good time both before and after farrowing, immediately increase her food supply and keep her trough well filled. Under this treatment the sow likewise becomes enthusiastic and produces heavier supplies of milk; consequently the young pigs get more than is good for them or is

PLATE 63 (Fig. 1).

This sow and litter, bred by a well-known Queenslander, Mr. H. Franke, of Cawdor, and owned by Mr. K. P. O'Brien, of Highfields, indicates that, where proper care and attention is given to the sow prior to, and to sow and litter after the birth of the pigs, excellent results may be obtained. These young pigs are active and vigorous, and live in clean, healthy surroundings where freedom from disease is a special feature. This sow has produced and reared litters of 12, 11, and 10, every litter being even in size and very healthy.

necessary, and as their digestive organs cannot effectively deal with the extra supply, stomach and bowel disorders are immediately set up and these are generally accompanied by indigestion and later by inflammation of the stomach and intestines. The pigs then sicken and a feverish condition follows; the bowels refuse to act properly and grey coloured, evil smelling, profuse diarrhœa follows. The young pigs do not immediately lose their appetites, but their condition gradually grows worse, and they begin to die off. The owner frequently thinks they are dying of starvation, and continues to force the sow with food so that she will produce more milk. The sow thus becomes overburdened with milk and as the suckers gradually drop away from her she cannot get rid of it; inflammation of her udders follows and she also sickens, and will probably suffer to such an extent as to lose her supply of milk altogether.

It is necessary to remember that the stomach of the young pig is very small and it requires small quantities of food only and at frequent intervals. They are, however, easily overdone and treating them is a difficult matter. To prevent trouble note that the sow should not be fed during the day she farrows; give her a thin gruel only about eight or ten hours after farrowing and very gradually increase her supply after the suckers are born and until they are a week or ten days old. She must have a supply of succulent green food, and be given regular exercise and when the pigs are ten days old they may be allowed to move about more freely and become accustomed to following the sow about. If, after all due care is taken to prevent the appearance of white scour in successive litters, it should occur and not readily yield to treatment, it would be better to seek veterinary aid, for the trouble may be due to infection, or indicate the incidence of other diseases more difficult of control or treatment. Parasitic infection

PLATE 64 (Fig. 2).

Bottle-fed pigs are more subject to diarrhœa than those reared by the sow and they are more difficult to treat, hence special care is essential when it becomes necessary to hand feed them. Given proper treatment, however, pigs fed in the way illustrated in this picture do very well.

is also liable to set up bowel disorders even in pigs not yet weaned, while exposure to the vagaries of the weather and especially to cold winds and rain also act as premonitary causes. In the more fatal diseases of the pig in which the respiratory organs are involved (swine pneumonia) and in swine fever and other diseases not prevalent in Australia, diarrhœa is invariably present, and has a weakening effect.

Procedure to Follow.

Prevention, or immediate control always being better and more satisfactory than cure, it would be wise immediately there is any sign of scouring in one or more of the young pigs to reduce the sow's food supply by half; compel her and the suckers to take exercise, give castor oil in the food as advised; move the sow and suckers to a clean, dry pen, and feed the sow very lightly for a few days. If the ailment

persists, give the sow a second dose of oil; give each of the suckers teaspoonful doses of castor oil on the first day, and again on the next day if still scouring; sprinkle the floors and yards lightly with air-slaked lime, and keep them scrupulously clean: add a cupful of lime water to the sows food every day, and be careful, not only to use sweet clean food, but also to place it in a clean food trough in a clean pen. Later, when the young pigs begin to feed on their own, give them some lime-water too; it does them no harm as long as it is not used too freely. The lime-water is readily prepared by taking a tub or barrel, cleaning it out thoroughly, and soaking in clean water for a day or two. Then half fill with clean rain water and put about half a bucketful of air-slaked lime in the barrel and after stirring water and lime together allow this to settle for several hours. It will be

PLATE 65 (Fig. 3).

Mrs. Percy Campbell takes a hand at feeding the orphans. It is scenes like this (and in Fig. 2) that illustrate the intelligent interest Queensland women-folk have in farm affairs. A little extra care and attention means much in matters of this description.

noticed that a thin scum floats on the surface and that the water is as clear as crystal. As long as this scum forms daily, the lime-water is good, and the barrel can be refilled after use. Stir the lime up occasionally and it will be good for two or three weeks at least. When the scum fails to appear on the surface, clean the barrel out, and start again with a fresh supply of lime and water. Never use an iron or tin container for this purpose.

Cleanliness is next to godliness in all matters relating to pig management. Common sense methods of feeding and care are also golden rules, and a knowledge of the cause and effects of the common diseases to which stock are subject will be of the greatest value at all times.

Boiled Rice as a Remedy for White Scour.

Boiled rice has been used with some success in the feeding of pigs suffering from this trouble as also the water in which rice has been boiled, barley water or gruel made up of milk and flour fed warm, may also be given. In the case of very young pigs a dessertspoonful of warm rice water two or three times a day will suffice; it must be given in teaspoonful doses as a drench, and the suckers should be kept away from the sow for at least two hours after dosing. Suckers that still have a good appetite should be given both boiled rice and the rice water or barley water or gruel and no other food should be allowed while this is being given.

In severe cases try the addition of half an ounce of prepared chalk to the food of the suckling sow. The addition of cod liver oil and a small quantity of bicarbonate of soda may also be helpful, especially if the suckers must be hand reared.

The following have been compiled as "Golden Rules" for the breeder who wishes to ward off attacks of diarrhœa and other troubles in his pigs:—

(1) Do not feed the sow immediately before or after farrowing, and feed very lightly during the first ten days she is rearing her litter. Allow plenty of clean drinking water, green food, charcoal, and other mineral matters.

(2) Do not feed sour, decomposed, or musty foods to pigs, and be careful also to keep musty, mouldy bedding out of the sow's sleeping quarters.

(3) Avoid changing the sow's food while she is suckling her litter. If a change becomes necessary, effect the change over gradually.

(4) Strictly avoid using insanitary feeding troughs and keeping pigs in unclean sties. Faulty construction of sties, badly drained yards, and exposure are all detrimental to the development of healthy pigs.

(5) Remember that improper feeding of the sow; digestive disturbances of the sow; bacterial contamination of the sties, food troughs, feeding and mixing buckets, contamination of the food by urine or faeces of other animals; cold, draughty sties, &c., all operate against your success.

(6) Strict cleanliness is essential. Immediate action on the appearance of disease means a great deal.

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

ANNUAL PIG SCHOOL AT GATTON.

The fourth of a series of schools of instruction for farmers interested in pig raising, concluded at the Queensland Agricultural College at Gatton recently, proved to be the most successful yet held. Subjoined is a brief account of the activities of the school.

FARMERS attending the school were from the following districts:—Thornton and Oakey on the Downs; Wondai and Nanango in the South Burnett; Kilcoy, Eumundi, Gympie, Fairymead (Bundaberg), on the North Coast; Millaa Millaa on the Atherton Tableland; Longreach in the West; Ipswich, Kentville, and College nearer the metropolitan area; and Sydney, N.S.W.

Opportunity was taken, in the course of the school, to visit Murarrie (Co-operative) and Oxley (Foggitt Jones, Ltd.) bacon factories, the Stock Experiment Station, Yeerongpilly, and the Offices of the Department of Agriculture and Stock, Brisbane.

The consensus of opinion among those attending was that these schools of instruction are invaluable means of adding to practical knowledge on important points in animal husbandry, as well as acquiring new information on modern developments in the industry.

A comprehensive lecture list embraced all the subjects likely to interest the pig raiser seeking to improve his own industrial efficiency. The syllabus included

PLATE 66.—VISITING LECTURERS WITH MEMBERS OF THE 1931 PIG SCHOOL.

Front Row, *Left to Right.*—D. A. Bain (Longreach), J. E. Turpin (Forest Hill), E. S. Lewis (Ipswich), S. Burns (Wondai), S. H. Shelton (Gatton College), N. Diamond (Sydney, New South Wales).

Second Row, *Left to Right.*—J. F. F. Reid (Editor, "Queensland Agricultural Journal"), C. T. White (Government Botanist), W. B. Granville (Nanango), W. Murnane (Kybong), E. Rumball (Greenmount), H. Archibald (Oakey), E. J. Shelton (Senior Instructor in Pig Raising).

Back Row, *Left to Right.*—W. J. Hartley (Kilcoy), T. Mullin (Millaa Millaa), J. McBurney (Eumundi).

Absent from Group.—J. Sutton (Fairymead, Bundaberg).

PLATE 67.—A TOP RAIL ARGUMENT.

Members of the 1931 School of Instruction discussing pig points. Mr. Shelton, on the extreme right, is the referee.

PLATE 68.—YOUTH'S INQUIRING MIND.

The youngest member of the school absorbed in his examination of a pig's glands. Major Mackenzie is the demonstrator.

discourses on anatomy, breeds, animal husbandry in all its relative branches, selection of sites and designs and construction of piggeries, diseases and their treatment, market requirements, slaughtering and curing, plants poisonous to stock, school club work and rural economics.

The school was under the directorship of the Principal of the College, Professor J. K. Murray, with Mr. E. J. Shelton as Chief Instructor. The lecturers included members of the College staff and officers of the Department of Agriculture and Stock.

Pig Feeding Experiments.

The visit of the students to the Yeerongpilly Stock Experiment Station, where a series of pig-feeding experiments are being carried out, by direction of Mr. H. F. Walker, the Minister for Agriculture and Stock, was of particular value to them. The first results of those experiments are detailed in a very interesting report published in the last issue of the Journal.

The visit to the Department also had a highly instructional value, particularly in respect of the work the students saw in progress in the chemical and entomological laboratories. The extent and importance of scientific research as applied to agricultural problems in Queensland proved an eye-opener to the visitors, and they left impressed with the great value of the investigational work of the scientists engaged in dealing practically with many of the agricultural problems of the day.

PLATE 69.

Members of the 1931 Pig School en route to Bacon Factories to study modern methods of treatment of the Product.

QUEENSLAND SHOW DATES.

Imbil: 2nd and 3rd September.
Noosa: 9th and 10th September.
Enoggera: 12th September.
Beenleigh: 18th and 19th September.
Malanda: 23rd and 24th September.
Rocklea: 26th September.
Brisbane River Camp Draft: 25th and 26th September.
Kenilworth: 26th September.
Southport: 3rd October.
Nerang: 9th October.
Evelyn Tableland: 9th and 10th October.

TROPICAL FRUITS AND STRAWBERRIES.

HARVESTING, PACKING, AND MARKETING.

By JAS. H. GREGORY, Instructor in Fruit Packing.

GROWERS of many of our tropical fruits are anxious to improve their marketing, but are not sure of the correct method of obtaining the best results. A study of the following information should be of assistance:—

GENERAL HARVESTING CONDITIONS.

As in the case of other fruits, care is essential for the successful handling of tropical fruit. Climate and temperature when harvesting is in progress are big factors in the successful carriage of tropical fruits to local and distant markets. These fruits are of such a delicate nature that every care must be taken to cut out carelessness and rough handling. Care should be taken by growers to see that fruit after harvesting is allowed to cool before being packed. Close attention to this point is necessary if fruit is to be carried over long distances and is expected to be in a satisfactory condition when it arrives on the market. Fruit packed while in a heated condition holds the heat for a long period during transit, thus causing premature ripening or sweating, with the certainty of the consignment opening up in an over-ripe or wet and musty state, which is just the condition suitable for the development of moulds and transit rots. Fruit in this plight has only a short commercial life, and has to be sacrificed by the agent to distributing retailers for rapid disposal, usually necessitating a substantial reduction in price to ensure a quick sale. Such sales often have a detrimental effect on the price or the demand for sound consignments. By taking advantage of the time of the day, and picking the fruit while its condition is unheated, precooling is made considerably easier. If necessary, after picking, spread the fruit out in a cool place to reduce its temperature before packing. A flat-topped table with the surface covered with bags or other soft material is just the thing required for cooling, and is also a good sizing and packing bench.

PACKING THE PRODUCT.

Care in Making Cases.

Growers, after taking every care in handling their fruit while harvesting and packing, often, through carelessness in making and nailing down cases, offset an advantage already gained by careful handling. Careless nail-driving, causing nails to protrude inside the box from the timber of the case, often results in damaged fruit with consequent waste. Nail-marked fruit decays, breaks down, and affects adversely the sound fruit in the box. Nails protruding through the outside of a case are a danger to all handling it in transit, often causing bad cuts or loss of temper, and rough handling in consequence. Extra care in such matters is well worth while, and saves trouble.

The "Get Up" of the Package.

Attractiveness is the main feature to be studied, anything added or done to make the product worth more to the buyer is a big factor in quick sales and higher prices. The following points are well worthy of consideration:—

Use only clean, well-made cases. Second-hand cases often carry insects and fungus diseases.

Plain white or coloured paper is much more attractive and cleaner than news-print, while the extra cost is only a fraction of a penny.

Where it is necessary to use packing, clean woodwool is preferable to most types of grass and other packing.

Fancy labels are an improvement, but if using stencils or rubber-stamps care should be taken to apply them neatly and so avoid smudging and spoiling the appearance of the finished package. The packer's full name and address, with variety and contents of the case, as required by the Fruit and Vegetables Act, should be embodied in labels or stencils.

Wiring the case is an improvement. Often the wiring together of two small cases to make one package is an economy and an insurance against the rough handling of smaller packages. Wiring is also an attraction to the buyer who desires to despatch fruit to distant places.

CUSTARD APPLES.

Harvesting.

Picking custard apples at the right time is also essential in keeping buyers and consumers satisfied, besides helping in keeping up the demand. Custard apples picked too soon inevitably go black and become unsaleable and unattractive. The fruit should be picked when it is in a firm, mature condition to ensure good carrying and ripening qualities. A good indication of the correct time to harvest custard apples is when the interstices between the corrugations of the fruit have turned to a rich creamy colour. Fruit picked at this stage, if firm, will carry well and ripen excellently. Packing will present no difficulties if the operation of sizing and that of packing are carried out separately.

Sizing.

To obtain the best results when marketing custard apples, care should be taken to pack the fruit in the best possible manner for marketing. Clean, new cases, nicely stencilled with the packer's name and address and the number of fruit in the case, add to the market value of the product. Most custard apple growers consider it unnecessary to size and pack their fruit. Like all other fruits, when this is done the value is considerably raised, both from the seller's and buyer's point of view. Buyers do not like to purchase fruit of mixed sizes, as they have no means of arriving at what a case containing varying sizes is going to realise when sold at so much per individual fruit at prices varying according to the size. When a case is sized this return can easily be calculated, and a price paid accordingly. When a buyer cannot calculate the actual return he is likely to receive for a case of fruit, it is only to be expected that he will be careful to safeguard himself and pay a lower price than the fruit is actually worth.

Sizing is an operation that should be carried out in the shed before packing. An excellent sizing table is one with a flat top, covered with clean sacks, with a 3-inch high beading around the edge to stop the fruit from rolling off. For best results the operator should size by hand into at least four different heaps of fruit of approximately even dimensions. It is also advisable to clean the fruit by carefully brushing if its appearance is affected by Mealy Bug or other pests.

Packing.

By packing two different counts from each heap packers will size the fruit automatically into six or seven sizes. The best container is the dump half-bushel case, 18 inches by 7⅛ inches by 8⅜ inches. For the larger sized fruit, with the counts 8, 10, 12, and 14, the case is best made up in the narrow way—viz., 18 inches long by 7⅛ inches wide by 8⅜ inches deep (see Plate 70); but for the smaller sized fruit, with the counts 15, 18, and 21, the wide way, 18 inches long by 8⅜ inches wide by 7⅛ inches deep, will be found most satisfactory. (See Plate 71.)

Following are the packs and counts:—

NARROW CASE PACKS.

18 inches long by 7⅛ inches wide by 8⅜ inches deep.

Pack.	No. in First Layer.	No. of Layers.	Total.
1 x 1	4	2	8
1 x 1	5	2	10
1 x 1	6	2	12
1 x 1	7	2	14

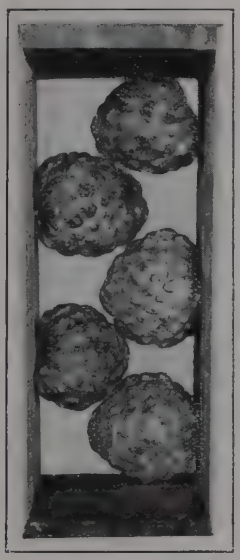
WIDE CASE PACKS.

18 inches long by 8⅜ inches wide by 7⅛ inches deep.

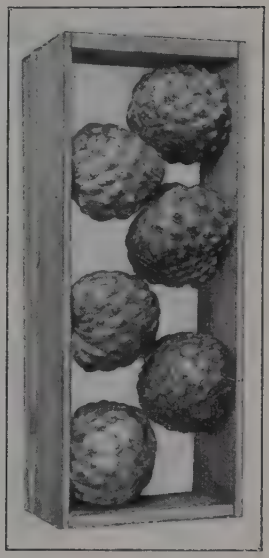
Pack.	No. in First Layer.	No. of Layers.	Total.
2 x 1	8	2	15
2 x 1	9	2	18
2 x 1	11	2	21

First Layer 1 x 1 Custard Apple Packs.

8 Count—1st. Layer.



10 Count—1st. Layer.

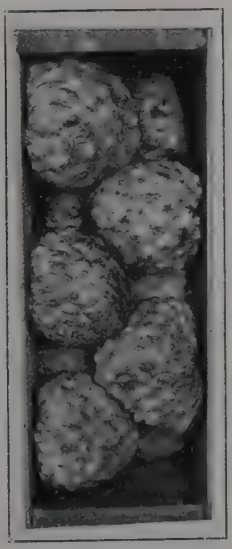


12 Count—1st. Layer.

Note the protection given to the soft points of the fruit.

Finished Cases.

8 Count—Finished Case.



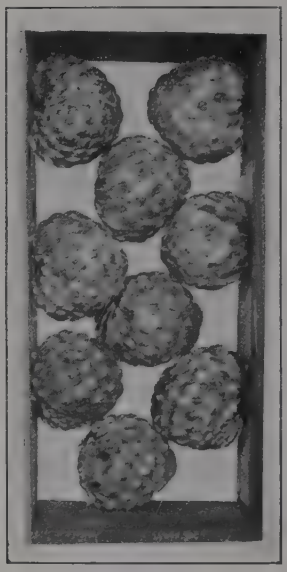
10 Count—Finished Case.

12 Count—Finished Case.

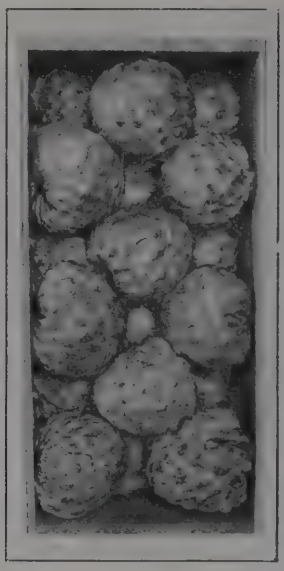
PLATE 70.—CUSTARD APPLE PACKING FOR THE LOCAL MARKET.

Large sizes. Australian Half Dump Case. Case made on narrow system 18″ long x 7$\frac{1}{4}$″ wide x 8$\frac{5}{8}$″ deep.

2 x 1 Custard Apple Packs.



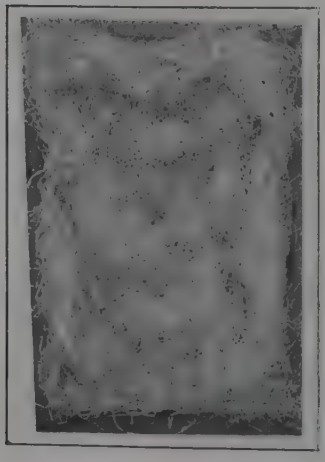
18 Count—1st. Layer.



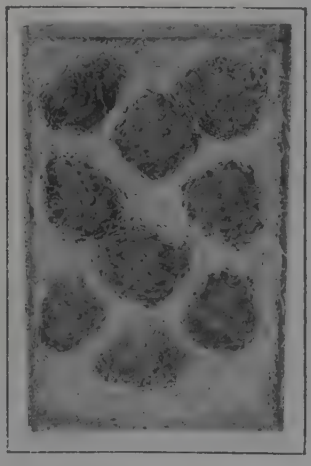
18 Count—Finished Case.

Note the protection given to the soft points of the fruit.

PLATE 71.—CUSTARD APPLE PACKING FOR THE LOCAL MARKET.
Small sized fruit. Case made on the wide system 18″ long x 8⅔″ wide x 7⅛″ deep.



Case prepared with woodwool for placing the Custard Apples on.



Finished Case with the top layer of woodwool removed. Note the padding between each fruit.

PLATE 72.—CUSTARD APPLE PACKING FOR EXPORT.

These packs and counts should pack any average sized line of custards, but growers with only a small quantity would possible not need to do all of these counts.

With very large fruit it is better to adopt a single layer tray of a suitable depth. For distant markets the single layer tray is the best container. Owing to the irregular shape of the fruit commonsense has to be used in getting the fruit to fit in snugly, careful selection of irregular-shaped fruit to match each other being a great help in obtaining a good pack. Force should not be used under any circumstances. A bigger latitude in sizing is necessary in handling custard apples than in handling fruit, such as citrus or tomatoes. Only a quarter of an inch variation is allowed in citrus and kindred fruits, but the variation in the sizes of custard apples will greatly exceed this according to the shape of the fruit. One of the main objects of packing is the protection that it gives the fruit, and growers when packing want to keep this object in view. As custard apples soften first at the point or opposite end to the stalk, the packer wants to keep foremost in his mind the placing of fruit to the best advantage to protect the parts which might soften first while in transit. By keeping the point of the fruit turned inwards from the wood of the box the maximum amount of protection is obtained from bumps and vibration during handling and in transit. A study of the illustrations will help to explain this.

If a packer happens to use other counts and packs than those given here, a close attention to the protection of the fruit will be of assistance in good transit and satisfactory condition on arrival at the markets. Cases should be packed high enough above the top of the box to allow a slight pressure to be placed upon the fruit by the lid when nailed down. Care should be taken that there is no loose fruit in the case as the constant rattling and vibration in transit will soon render the fruit unfit for sale. It is well to remember that one broken custard apple will often make a mess of the whole consignment.

Packing for Export.

For long distance transit the best container is the single layer—half-bushed standard, 18 inches long by 11½ inches wide by 5¼ inches deep—tray with the fruit nested or padded in woodwool. (See Plate 72.) The tray is first prepared by placing a layer of woodwool on the bottom and around the ends and sides. The fruit is then placed in position in a single layer with a small space between each fruit. It is advisable not to wrap custards when sending long distances, as it hastens the process of ripening. Woodwool is then placed in the spaces between the fruit to form a small pad for each fruit, and a layer is spread on the top of the pack and the case nailed down. The whole case should be packed so that it will not rattle when shaken gently. Fruit packed in this manner carried to Tasmania for show purposes, and although soft on arrival was exhibited for three days, and was then still in good eating condition. Fruit packed without woodwool in the same type of container was unfit for consumption on arrival at the show. Care should be taken that no fruit projects above the top of the tray before nailing down. Two trays wired together make a handy package for transport over long distances. No difficulties in marketing should be experienced by growers if judgment and commonsense are used in handling these fruits.

PAPAW PACKING FOR DISTANT MARKETS.

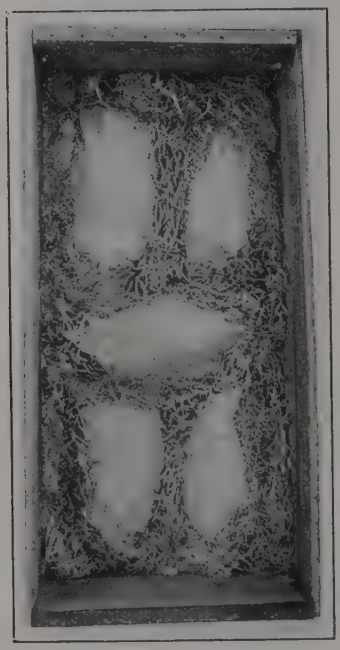
Sizing.

In packing papaws the foremost idea in the mind should be the best method of giving the maximum protection to the fruit in transit, and the packing of the fruit so that it will display to the best advantage when exposed for sale. Before being packed the fruit should be cooled and sized. To assist in making the operation of packing easier, it is a great help to endeavour to match the various-shaped papaws whilst sizing them into heaps. Four sizes should be sufficient to cover the packing of papaws for export. As with custard apples, sizing is easily done on a flat-topped table covered with soft bags or other suitable material. Many growers do not think it necessary to go to this trouble, failing to appreciate that the skin of the papaw is exceptionally tender, and that the slightest scratch will cause the fruit to bleed, thus damaging the appearance of the fruit.

Packing.

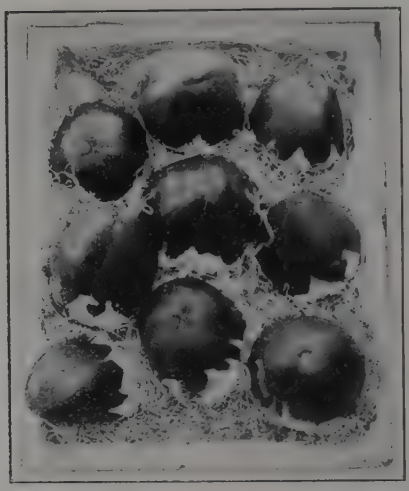
The best container for long-distance carriage of papaws is the tropical fruit case, 24¾ inches long by 12 inches wide by 12 inches deep. (See Plate 73.) Woodwool is the most satisfactory packing. The box is prepared by placing a layer of woodwool on the bottom of the case and around the ends and the sides. Each papaw is then wrapped in

soft paper and placed in a single layer in the prepared box, using small pads of woodwool to make individual fruit firm and snug. A thin layer of woodwool is then placed over the top of the fruit, and the process is repeated until the case is full, finishing off with a layer of woodwool packing on the top. It is unwise to have the fruit projecting too far above the top of the box, but the lid of the case should press just firmly enough to keep the fruit snug and firm. Packers should avoid placing too much padding in the case. Care in matching the various-shaped fruit will greatly assist in this. By using a coloured wrapper in conjunction with the woodwool a very attractive package can be placed on the market. Care in eliminating all green, over-ripe, or diseased fruit when packing is absolutely necessary to ensure safe transit and satisfaction to buyers.



Packed in Tropical Fruit Case 24¾″ x 12″ x 12″. Fruit wrapped in soft paper and nested in woodwool.

PLATE 73.—PAPAWS PACKED FOR EXPORT.



Packed in the Dump Case used as a tray by removing the side; 18″ long x 14¼″ wide x 8⅝″ deep. Note the woodwool padding between the fruit.

PLATE 74.—PAPAWS PACKED FOR LOCAL MARKET.

Packing for Local Markets.

Growers who are near enough to their markets to be able to use motor transport have a decided advantage over those who have to send over long distances. The fruit can be left on the tree to become almost fully ripe before sending to market, and it is not necessary to pack in the same manner as when sending farther afield. Close attention should be paid to the elimination of all disease-infected or marked fruit, and sizing should also be rigidly adhered to. The Australian dump case, made in the form of a tray 18 inches long by 14¼ inches wide by 8⅝ inches deep, is a good container for the local market (Plate 74). The fruit is packed on end in a single layer resting on a layer of woodwool or similar packing. As a protection against rubbing the bottom end of each fruit, it should be wrapped for about two-thirds of the way up in clean white or coloured paper, while each fruit is made snug and tight by pushing pads of woodwool in between each fruit. Papaws packed in this way have a very attractive display value, and sell much more readily than those carelessly placed in cases without packing, the buyer being able to appreciate the quantity and quality at a glance.

MONSTERIA DELICIOSA.

Packing for Distant Markets.

This is a fruit that is not as well known out of Queensland to the extent that one would think. Many people at the Hobart Exhibition tasting the monsteria for the first time were favourably impressed, and were keen to know where supplies could be secured. Many specimens of this fruit bought by people did not come up to expectations through being immature, growers being afraid to allow the fruit to stay long enough on the plant on account of its tendency to fall to pieces when ripening. This can be overcome by harvesting at a later date and, when packing, winding a strip of paper around the fruit to prevent the outside shell from falling as the fruit ripens. Fruit packed like this ripened over its entire length, and still retained its full flavour when being consumed three weeks after being harvested in Queensland, having in that period travelled from Queensland to Hobart and back to Melbourne. The standard half-bushel case, 18 inches long by 11½ inches wide by 5¼ inches deep, is an ideal case for the monsteria. The fruit is packed in layers and made snug by placing a thin layer of woodwool on the top and bottom and between the layers. Lining the case with clean white or coloured paper is an added improvement to the appearance of the case.

PACKING STRAWBERRIES.

Containers.

Many containers are used for marketing strawberries. In some of the Southern States a punnet is in general use, but as this container has the disadvantage of containing more than one layer of berries with each layer resting upon the other, it is not as good a container as the single layer packed boxes in general use in Queensland. There are two types of boxes in use—one which measures 8 inches long by 4 inches wide by 1¼ inch deep, and the other 24 inches long by 8 inches wide by 1½ inch deep, measured clear of a central partition which it has. The smaller of the two containers is preferable, because it gives less latitude for mistakes and spoiling the appearance and alignment of the fruit when packing. Being smaller, it will not give the fruit as much play to become loose in the box through careless handling, so causing damage through rubbing and otherwise. It is also a better container for retailing, the larger box or tray, which contains the equivalent of six smaller boxes, holding too much fruit for the average buyer, necessitating repacking into smaller boxes. As the strawberry is such a soft fruit, it is necessary to handle it as little as possible. The smaller container also has the advantage of allowing better sizing and packing when the supply of fruit on the farm is short for marketing. Twenty of the boxes 8 inches by 4 inches by 1¼ inch will just fit comfortably into a half-dump case.

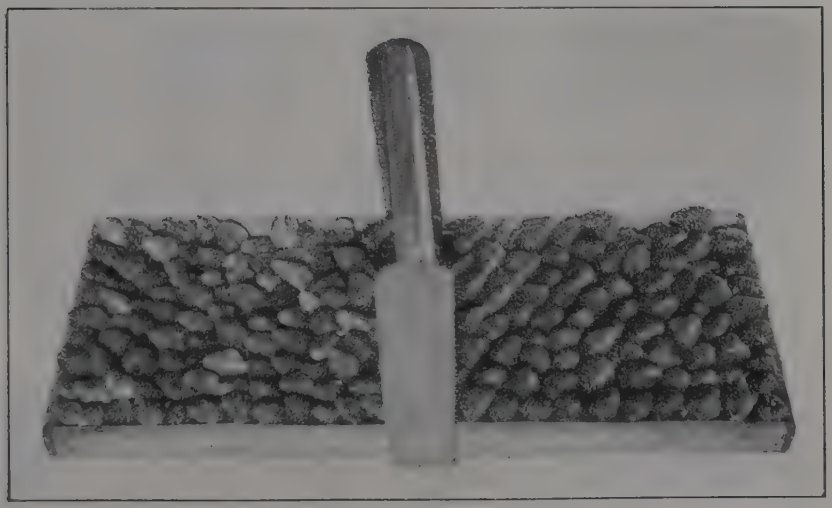


Plate 75.—Picking Tray filled with Fruit.

Note the Different Grades and Colour of Fruit that are placed at either end of the Tray when picking.

PLATE 76.—METHOD OF STARTING TO PACK.
Note the placing of the leaves to separate the fruit.

Threes. Fours. Fives.

PLATE 77.—FINISHED BOXES.
Note the alignment of the fruit in each box. Also the placing of the leaves between each row of fruit.

Handling.

Unlike other fruits, the strawberry does not necessitate a large, complicated, costly equipment in the packing-house to size and grade. This is done by hand, and much labour can be saved by grading while picking. Sizing is best done in the packing-house.

A good picking container is a tray with a handle. (See Plate 75.) When picking, the first-class berries fit for marketing can be placed at one end of the tray, and second-class or factory berries placed at the other. By doing this the berries are automatically graded. Berries are packed for market in three sizes—threes, fours, and fives. Sizing is done while packing, the packer having a box for each size. Women and girls usually make the best berry packers, having as a general rule a lightness of touch which is often lacking in the case of men operatives. Berries with grains of earth adhering to them, as is often the case after rain, should be gently brushed. This can be done by placing a soft lacquer brush as a fixture, standing upright in the bench, and by taking the berry by the stalk and gently running it through the bristles of the brush.

Packing.

The method of packing is simple enough. The box is first prepared by placing a prepared leaf across the end of the box—passion fruit leaves are very suitable, while fern leaves are sometimes used where passion fruit leaves are not available—with the leaf projecting high enough to reach to the top of the box, and at the same time being bent enough to place thereon the first line of berries—threes, fours, or fives, according to size. The berries should be placed on their stalk ends with the points up, allowing the point of the fruit to reach to the level of the top of the box. (See Plate 76.) Another prepared leaf is then placed in the box, bent so as to rest on the bottom of the box to have the next line of berries placed thereon, while the remainder of the leaf rests against the first line of berries and acts as a separator of the lines of fruit. This process is repeated until the box is filled. (See Plate 77.) For travelling a layer of leaves placed on top of the finished pack is an assistance.

Points to be watched are—

See that the fruit is placed so that it will come as near as possible to the top of the box, and it will then keep snug when the lid is placed in position.

Avoid packing too high.

Keep the alignment of the fruit straight both across the box and from one end to the other. (See illustrations of packed boxes.)

Avoid placing too large pieces of packing leaves between the berries.

See that the berries do not rattle in the box after the lid is placed in position.

Keep all badly-coloured berries out of the box, as they spoil the commercial appearance of the package when displayed for sale.

On no account pack damaged berries, no matter how slight—they spoil the keeping qualities of the box. One bad berry soon makes a whole boxful practically unsaleable.

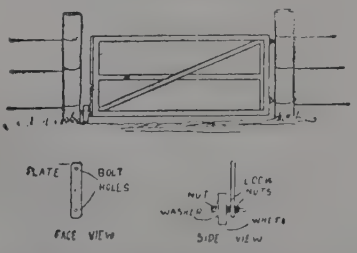
It is recommended that growers should stamp the pack of the fruit on the lid of each box, so that when being sold the seller can see at a glance whether they are threes, fours, or fives without having to remove the lids. This would be in addition to the name and address of packer required by law in letters $\frac{3}{16}$ inch at least in height to be stamped on the top of the lid and the end of the box. Use rubber stamps, as they are quick in application and make a finished job. When sending away packed in cases, see that stencilling is done neatly and free from edge of the stencil plate smudges.

ACKNOWLEDGMENT.

Thanks are due to Mr. Beckley, of Wellington Point; Mr. Chataway, of Raby Bay; and Mr. McLeod, of Brookfield, for their assistance in making available the fruit necessary to provide the illustrations in this article.

WHEEL SUPPORT FOR GATE.

When the average gate is being erected insufficient clearance is given, with the result that in time the gate drags. To overcome this defect when it is evident, is a simple matter. Proceed as follows:—Get a small iron plate, drill three holes in it, the two to be used for bolting on to the gate member, and the lower one to be used for the wheel. A bolt is passed through the lower hole of plate with a lock-nut



on either side to keep both secure. Then a small plough or similar wheel is put on the bolt, and secured by the other nut on the free end of bolt. This prevents the gate from sagging, and permits of it being easily opened and closed, the weight of the gate being borne by the wheel, which is in contact with the earth.

This device can be easily and readily made out of old material.

DEVELOPMENT OF TOBACCO GROWING.

Mr. H. F. Walker (Minister for Agriculture) announced recently that plans of the Government for the development of tobacco growing do not include a scheme whereby an advance of £5 will be made to every farmer around Brisbane who grows at least one-quarter acre of approved tobacco, or that tobacco leaf produced by growers of small areas will be flue-cured by the Government irrespective of its place of origin.

The Government is keenly alive to the possibilities of establishing a valuable tobacco-growing industry in Queensland, but its development must take place along sound lines, and every element of unnecessary risk must be eliminated as far as it is possible to do so.

With the possibility of building up a permanent industry to take advantage of the assured market in Australia, consideration has to be given to the preservation of the reputation already established for Queensland bright tobacco, and to the protection of prospective growers who, owing to the necessity for a considerable outlay of capital for the commercial production of bright, flue-cured tobacco leaf under modern conditions, might be involved in financial losses if large-scale attempts were made under unsuitable conditions of soil and climate.

The Government already is in possession of valuable data available for the guidance of growers as a result of experiments carried out in conjunction with the Australian Tobacco Investigation at Mareeba, Sarina, Rockhampton, and Miriam Vale.

There are other districts outside of the recognised tobacco-growing areas where, quite possibly, conditions of soil and climate would be suitable for tobacco growing, but they can only be determined definitely by experiment. The Government is conscious of the fact that farmers in many localities are eager to try the crop, owing to the exceptionally low prices ruling for many other farm products, and that they need some guidance as to the suitability or otherwise of their district. Consequently it has been decided that the Queensland Government will carry out experimental trials in six districts—namely, Collinsville (Bowen), Byfield (Rockhampton), Bundaberg, Maryborough, Beerburrum, and Amiens (Stanthorpe).

One trial plot will be established in each district on a location to be selected by the Department of Agriculture and Stock, a local farmer being asked to co-operate with the department in carrying out the trial.

Additionally, a tobacco flue-curing barn will be erected in the precincts of the Department in Brisbane for the curing of leaf grown on the experimental plots.

The proposed extension of tobacco experimental and instructional work to the Southern Division of the State will necessitate a rearrangement of the instructional staff of the Department, including the transfer to Brisbane of an officer at present stationed in North Queensland, who is experienced in tobacco cultivation and flue curing.

APPLES FOR THE KING.

The Minister for Agriculture and Stock (Mr. H. F. Walker) referred recently in terms of appreciation to the enterprise of the Summit Fruitgrowers' Co-operative Association, Limited, in arranging, through the Agent General for Queensland (Sir E. H. Macartney) for the presentation to His Majesty the King of a case of apples from the Stanthorpe district. This case formed part of a first shipment of deciduous fruit consigned to the home markets from the Stanthorpe district, and was shipped by the R.M.S. "Cathay," which arrived in London in May last.

The Agent-General, through the Secretary of State for the Dominions, secured the consent of His Majesty to the acceptance at Buckingham Palace of a case of apples known as the "Granny Smith" variety. The Secretary of State later conveyed to the Agent-General an expression of His Majesty's best thanks to the donors and to the Government of Queensland, with his best wishes for the success of the Queensland fruit industry.

Advices indicate that the whole consignment arrived in perfect condition, well packed, and drew appreciative comments from buyers. Prices realised ranged from 15s. to 18s., which compared favourably with those obtained from consignments of a similar class of fruit from other sources.

Mr. Walker desired to congratulate the association on their enterprise in initiating an export trade in Queensland apples, and trusted that the financial success of this consignment would prove sufficient encouragement to warrant exports next season on a larger scale.

PLATE 78.—VICE-REGAL VISITORS TO THE 1931 BRISBANE SHOW.

In the group are Their Excellencies the Governor-General, Sir Isaac Isaacs, and Lady Isaacs; the Governor of Queensland, Sir John Goodwin, and Lady Goodwin; and Messrs. W. A. Affleck (President), P. J. Symes, and H. W. Watson (Secretary), of the Royal National Agricultural and Industrial Association.

PLATE 79.

The Governor-General, Sir Isaac Isaacs, and the Chief Justice of Queensland, Sir James Blair, were among the ringside throng at the Brisbane Show.

The Governor, Sir John Goodwin, Lady Goodwin, and the Premier, Hon. A. E. Moore, and Mrs. Moore, were also among the notable visitors to the Brisbane Show.

PLATE 80.
Winning District Exhibit, A Grade, at the 1931 Brisbane Show, from the North Coast and Tablelands of New South Wales.

PLATE 81.
The Winning District Exhibit in B Grade, Brisbane Show, from Mount Larcom, Central Queensland.

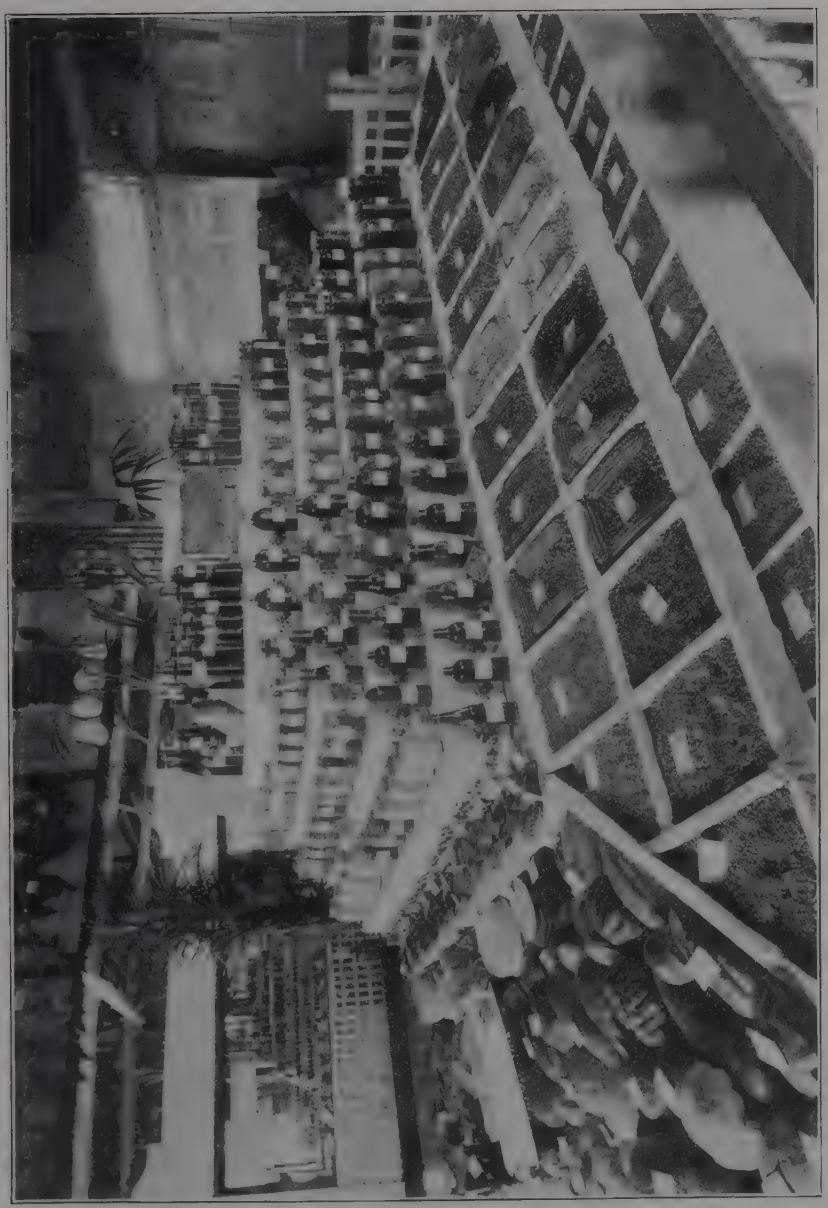


PLATE 82.

The Winning "One Man Farm" Exhibit at the Brisbane Show. Grown, made, and displayed by J. Beck, of Stanwell.

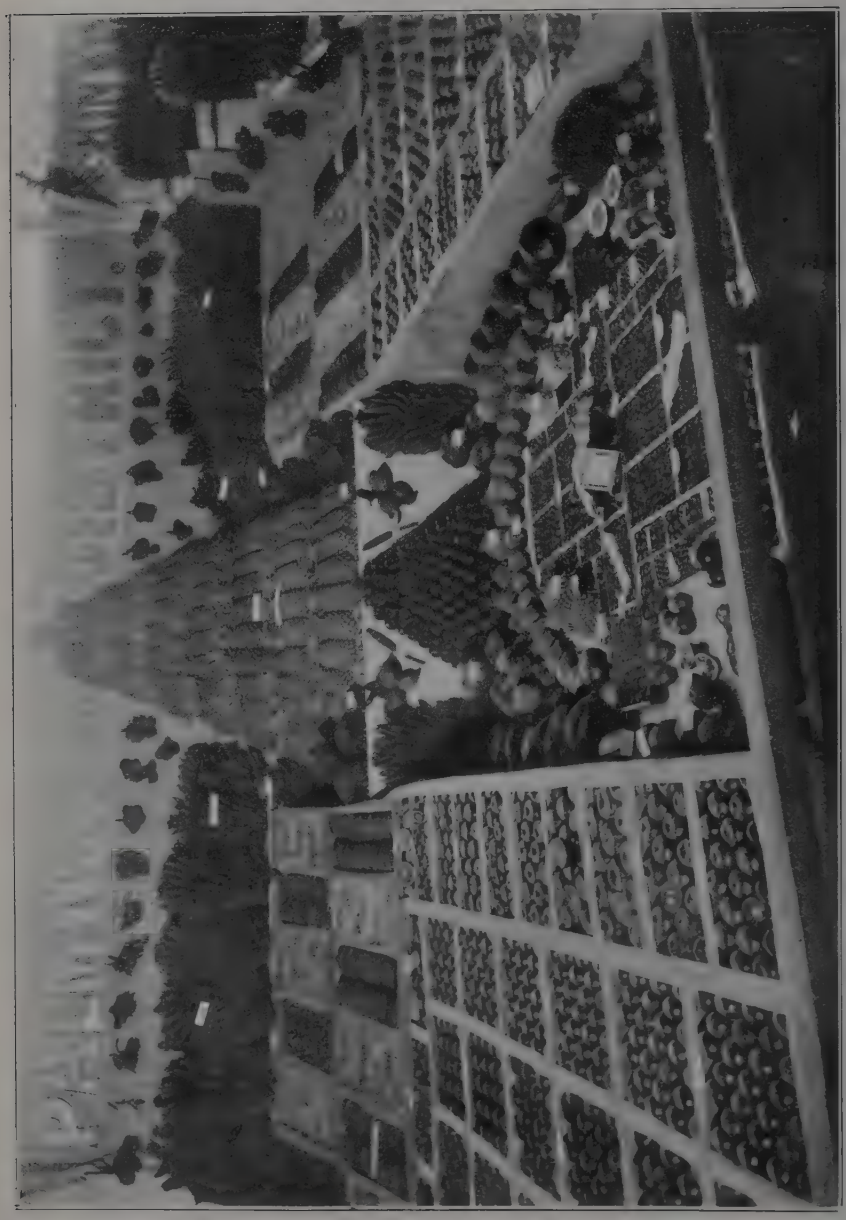


PLATE 83.—FRUIT EXHIBIT FROM PALMWOODS.
Awarded First Prize at the 1931 Brisbane Show.

PLATE 84.

This striking Diorama was a feature of the fine display of the Department of Agriculture and Stock in the Pig section of the Brisbane Show.

PLATE 85.

Panel of the Sugar Exhibit arranged by the Bureau of Sugar Experiment Stations in the Court of the Department of Agriculture and Stock at the Royal Brisbane Show, illustrating the genealogical "tree" of P.O.J. 2878, the "Java Wonder" Cane.

PLATE 86.

Sugar technology was illustrated interestingly in the Court of the Department of Agriculture and Stock.

PLATE 87.

The manufacturing side of the sugar industry was represented graphically in the display by the Bureau of Sugar Experiment Stations in the Departmental Court at the Brisbane Show.

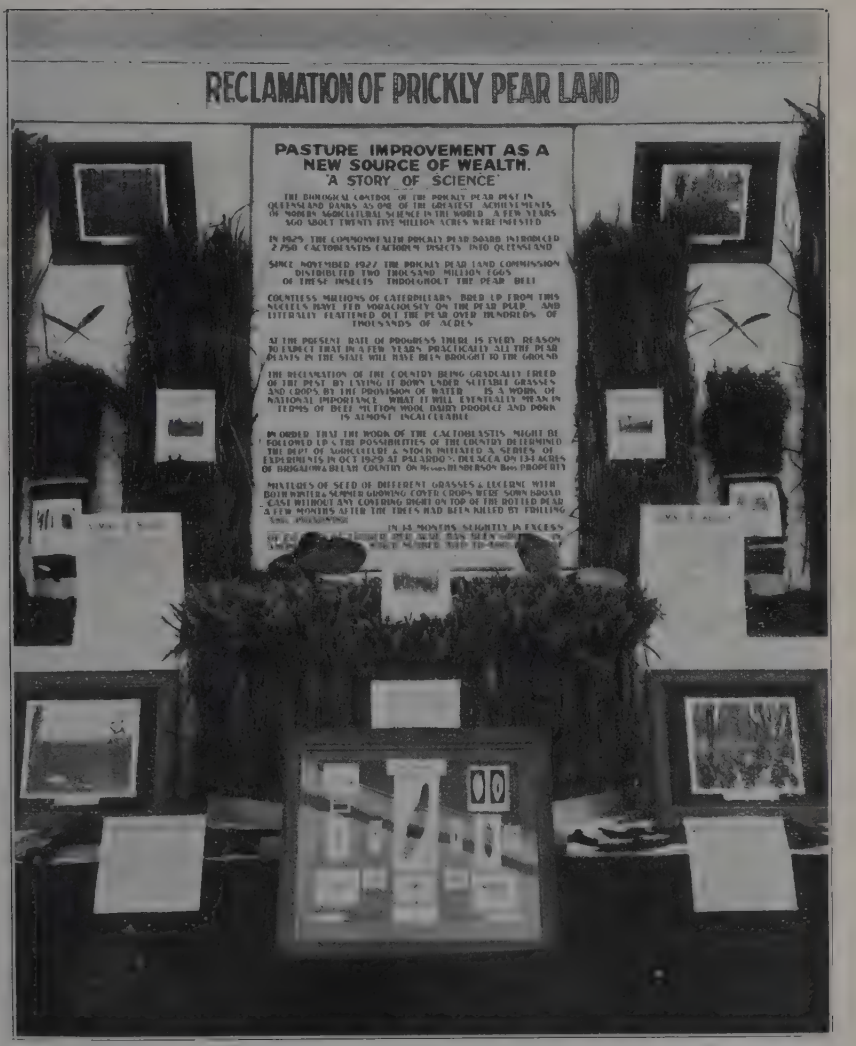


Plate 88.—An Impressive Panel in the Court of the Department of Agriculture and Stock at the Brisbane Show.

The success of biological control of the prickly-pear pest was well illustrated in this exhibit, as well as the subsequent reclamation of infested land.

The samples of produce displayed represent a heavy harvest of grass and fodder crops grown on land freed from the pear pest through the agency of an insect enemy, the *Cactoblastis Cactorum*.

In fourteen months slightly in excess of 20 tons of fodder per acre have been grown on what was formerly heavily infested soil, and among brigalow and belah trees, numbering from 300 to 400 to the acre, which had been killed previously by "frill" ring-barking and poisoning. The reclamation of this class of country, comprising many millions of acres in Queensland, must increase its stock carrying capacity enormously, and is therefore regarded as a work of great national importance.

PLATE 89.—THE "Q.A.J." AT THE EXHIBITION.

The Journal Alcove in the Court of the Department of Agriculture and Stock, 1931 Brisbane Show. Mr. W. E. Hagger in charge.

PLATE 90.—ECONOMY, NO LONGER THE DISMAL SCIENCE.

This Corner of the Court of the Department of Agriculture and Stock at the Brisbane Show, arranged by the Bureau of Economics, attracted a multitude of seekers after information on the rural economy of Queensland.

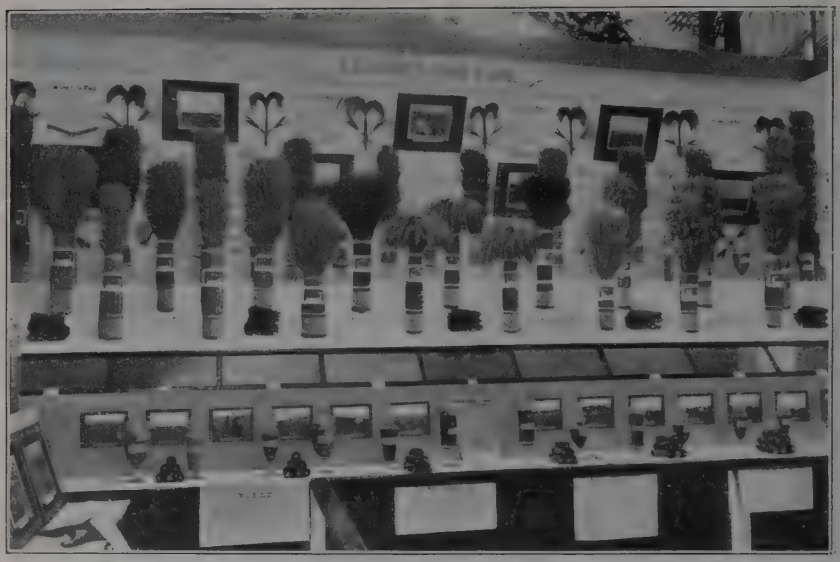


PLATE 91.—CEREAL AND FLAX DISPLAY IN THE COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK, BRISBANE SHOW.

This exhibit attracted much attention and illustrated the great progress Queensland has made as a grain-growing State, in respect of broad acreage, high yield, and excellent quality.

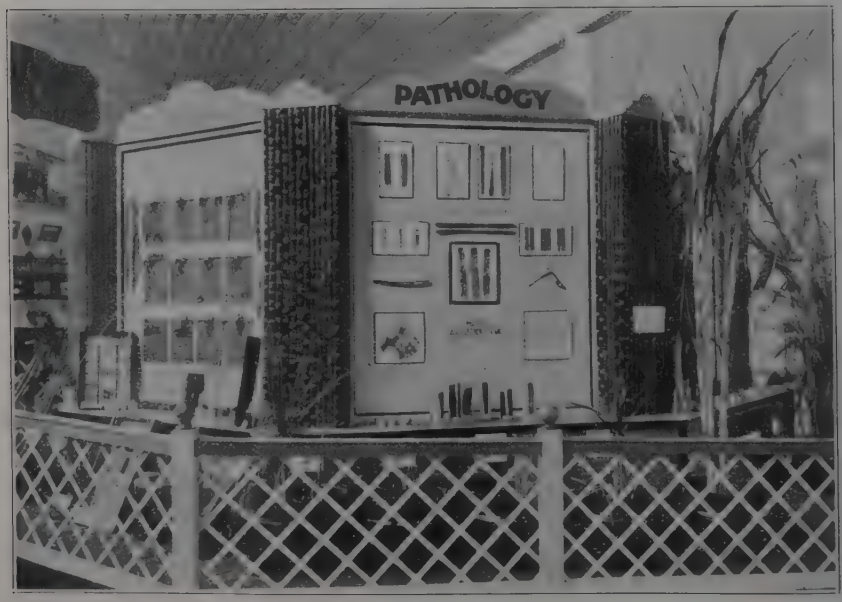


PLATE 92.

The Queensland Sugar Industry in all its branches was illustrated impressively by the exhibit arranged by the Bureau of Sugar Experiment Stations in the Court of the Department of Agriculture and Stock.

Plate 93.—The Dairying Industry was represented effectively by this Display in the Court of the Department of Agriculture and Stock.

Dairying is expanding remarkably in Queensland, where conditions are ideal for its development. Its annual value to the State is now about £8,000,000. The high reputation of Queensland butter and cheese is already well established on home and oversea markets.

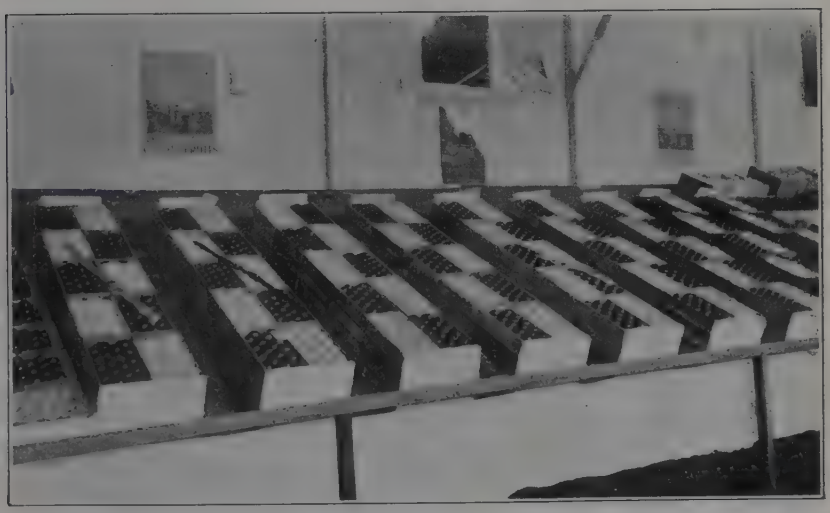


Plate 94.—Fruit Packing Exhibit by the Children of the Montville State School.

Awarded First Prize and the John MacDonald Shield at the 1931 Brisbane Show.

PLATE 95.

Tobacco Alcove in the Departmental Court, showing excellent samples of bright leaf grown at Mareeba, Townsville, Bowen, Sarina, Rockhampton, Miriam Vale, Brisbane, Ballandean, and Texas.

FARMERS' SHEEP AND WOOL.

By J. CAREW, Senior Instructor in Sheep and Wool.

[*Continued from the June issue.*]

PART VI.

This is the sixth article of a series planned for the purpose of supplying information sought from time to time by readers interested in sheep and wool; and also with the hope of stimulating interest in sheep raising in Queensland on comparative small holdings.

THE sheep and wool section of the Department of Agriculture and Stock, being interested in the welfare of the industry in Queensland is ever ready to do anything in its power to assist sheep farmers in any difficulty pertaining to their business. The sheep men are scattered practically all over the State, and unless they place themselves in communication with the Department in connection with any difficulty which they may encounter it is obviously impossible to give the service required.

POINTS IN SHEEP FARMING PRACTICE.

Merino Breeding for Wool and Mutton.

For this method of sheep farming suitable conditions and pastures are necessary. Where the annual rainfall is in the vicinity of 20 inches, with a supply of good water well distributed, an inter-mixture of grass, herbage, saltbush, and other edible shrubs, and well but not over shaded paddocks which can be conveniently worked, success is fairly well assured. A thorough knowledge of the business is also necessary, with an inclination to improve the flock by culling and selection.

Young Wethers for Wool Production.

Buying wethers when young and retaining them for wool production is a very safe undertaking and can be practised by those more or less inexperienced in sheep farming, but it is not so profitable as when breeding is carried on successfully. The country need not be so good. Where breeding may be a failure, wool growing can be carried on successfully. There are several influences that usually lead to the adoption of this system, such as want of shade on the exposed Western plains, distance from water, green timbered country, climatic conditions, and parasitic infestation.

Store Stock.

Buying store sheep to fatten and sell as soon as opportunity offers is usually practised where crops can be raised, and this enterprise is more suitable to plateau and coastal conditions.

Crossbreeding for Wool and Mutton.

This system is usually adopted in districts of heavier rainfall. In areas where the annual rainfall is over 25 inches, many crops suitable for running sheep on can be produced, and also for fodder conservation. In such localities the merino ewe, having grown to maturity in the West, may be mated with a suitable long-wool ram, the progeny of which make good growth. After the second shearing they may be fattened, when they make first-class mutton sheep.

Fat Lamb Raising.

This is an enterprise that must be confined to areas with a fairly good rainfall and suitable for the production of winter fodder crops or lucerne, and should be run on purely mixed farming lines.

Whatever method of breeding is adopted, purebred rams should be used, for blood tells in sheep raising, as in every other branch of animal husbandry.

Lamb Marking.

The method of yarding and working the ewes and lambs in preparation for marking operations vary according to the size of the flock, but the precaution of cleanliness in every respect is of first importance in all cases.

A good practice is to have a yard erected in the paddock where the ewes and lambs are running. This may consist of a large receiving yard (which may be of wire netting), and a small yard into which the lambs can be drafted for treatment.

Knives or instruments used in lamb marking should be sterilised first in boiling water, and then in an antiseptic solution. A quantity of this solution should be kept in a handy place for putting the marking instruments into at intervals. If small numbers are to be marked, all arrangements are made accordingly, and the one operator does the ear marking, castration, and tail docking, but where large numbers are to be treated there should be catchers, who first present the lamb to the ear markers, one marker to apply the registered mark and the other the age mark. All ram lambs should be placed on the marking rail with the two left legs held firmly in the holder's left hand and the two right legs in similar position on the right side. There are three distinct methods in use:—(1) Tipping: This is done by completely removing the tip of the purse, and is in more general use than any other method. (2) Slitting: This means that the purse is opened by splitting it down the centre. It is claimed by many who adopt this method that it heals quicker and gives more protection from flies. With either method the operator uses his teeth in drawing the testicles. When the wether is matured the result of the slitting shows to more

PLATE 96.—ON A QUEENSLAND SHEEP FARM—SAVING THE ORPHAN LAMBS.

advantage as the cod is better developed with a more regular and neater appearance. (3) The third method is that by which the purse is left intact. This operation is performed with the aid of powerful blunt-edged pincers which completely crush the cords without breaking the skin. The testicles are gradually absorbed in the system, leaving the cod large, which is an advantage in selling wethers as fats. After castration the lamb's tail is docked. This is done at the second or third joint. The skin should be pressed firmly to the tail, then held tightly and severed in one back-hand slash. The purse and tail wounds are then dressed. The dressing should consist of a healer as well as an antiseptic, such as a special patent proprietary solution, many of which are on the market, or 8 pints of standard liquid sheep dip to 100 gallons of water, to which may be added a little iodoform. A home-made dressing may consist of equal parts of Stockholm tar and fat, with the addition of one part kerosene or liquid dip to twenty-five parts of the mixture. A powder dressing may also be used, consisting of one part iodoform to ten parts boracic acid and sprinkled lightly over the wounds. After the wounds are dressed the lamb should be placed on his feet, preferably in the paddock with the ewes where, after mothering, they usually remain until weaned.

RETIREMENT OF MR. J. C. BRÜNNICH.

THE retirement this month of Mr. J. C. Brünnich from the office of Agricultural Chemist in the Department of Agriculture and Stock, under the age limit regulations, will mean the severance from official life of one of the most capable men in the service of the State.

His pending retirement has already been marked by many fine and fitting tributes to his worth and work in the metropolitan and country press.

A NOTABLE CAREER.

Mr. Brünnich was born at Gorizia, Austria, where his father was stationed as a minister of the Lutheran Church. In early youth he went with his parents to Switzerland where he received his primary education. He afterwards attended the Federal Polytechnic School at Zurich, where he studied chemistry under Professors Dr. Victor Meyer and George Lunge. Specialising in sugar chemistry he gained practical experience in beet sugar factories in Bohemia and Russia. Returning again to Switzerland to fulfil his military obligations, he became an officer of artillery in the Swiss service. There he made the acquaintance of the family of Dr. Muller who practised medicine for many years in the Gayndah district of Queensland, and on his glowing accounts of this State, Mr. Brünnich decided to come out here. He arrived in 1885, and secured the management of a small sugar refinery at Bulimba, and later became manager of a sugar mill at Darwin, North Australia. He joined the scientific staff of the Colonial Sugar Refining Company, with whom he remained for ten years. In the course of that time, he was mill manager and chemist at Homebush, North Queensland, where, under his direction, much experimental work was carried out, particularly in relation to cultivation and fertilising, including green manuring. He also conducted the first experiments there with the injection of carbon bisulphide for the destruction of cane grubs. In 1897 he was offered and accepted the position of Agricultural Chemist to the Queensland Government. Among other duties he held a lectureship in chemistry at the Gatton Agricultural College, his headquarters for some years. He then came to Brisbane and, in the early days of the Bureau of Sugar Experiment Stations, he was associated directly with that branch of the Department of Agriculture and Stock in the capacity of Supervising Chemist. He afterwards organised the Departmental laboratory, which is considered to be one of the most efficiently staffed and most completely equipped in the Commonwealth.

For the last twenty-five years Mr. Brünnich has been in full control of the agricultural chemistry activities of the Department, and has earned a reputation for his investigational work which is not confined to Australia. Men who have spoken in the highest terms of Mr. Brünnich's contributions to science are the late Sir William Macgregor, Sir Arnold Theiler, of South Africa, Sir John Russell, of Rothamstead, England, and Dr. Orr of the Rowett Institute, Scotland.

Mr. Brünnich's experience and knowledge were largely drawn upon, from time to time, in the preparation of legislation, for which no precedent existed. Such laws included the Fertilisers Act, Stock Foods Act, Margarine Act, and Pure Seeds Act.

While supervising a large and important branch of a Department, Mr. Brünnich managed to find time to carry out a large number of research and experimental investigations, among which may be mentioned:—

Fertilizer experiments at Buderim Mountain to demonstrate the possibilities, by means of the correct application of fertilizers, of bringing exhausted soil back to the economic bearing of banana crops.

Bringing before the notice of pastoralists the deficiency of both proteid matter and phosphoric acid contents of their pastures, and introducing the use of a sheep phosphoric lick by means of Nauru phosphate.

The advocacy of Paradichlorobenzene as a pest control.

An investigation into the pollution of rivers and streams by the discharges from sugar mills, and the giving of advice for the prevention of same.

Exhaustive analyses of soils from different parts of the State, and of fodders, grasses, plants poisonous to stock, gums, resins, essential oils, and tanning materials.

Experimental work with prickly-pear spray solutions.

Experiments with inks for branding meats.

The institution of the most effective and at the same time, most economical formula for a cattle dipping fluid.

PLATE 97.—Mr. J. C. BRÜNNICH, F.I.C., F.C.S., F.A.C.I.

Mr. Brünnich's contributions to scientific and popular literature are too numerous to list completely, but the more notable, in chronological order, are:—

1898—The World's Cane Sugar Industry.
Compositon of Foods.
Starch Contents of Potatoes.
Denitification.

1899—Boric Acid in Butter.

1900—Some Queensland Soils (Experiment Stations).
"What Kind of Manure should I Use?"
Analysis of Seeds of the Moreton Bay Chestnut.

1901—Full Analyses of Cheese and Butter at the Queensland Agricultural College.

1902—Hydrocyanic Acid in Fodder Plants.

1903—Analyses of Pineapple Plants, Fruits, and Soils.
Analyses of Seed Wheats and Maize.

1905—Green Manuring.
Poisonous Glucosides in Sweet Potato Vines.

1907—Fodder Analyses.

1908—Plants Poisonous to Stock.

1909—Formaldehyde Tests.
Farm Crops as Food for Stock.
The Land We Live On (Presidential Address, Royal Society).

1910—Analyses of Queensland Cheeses.
Destruction of Prickly-pear by Arsenical Sprays.
Wheat Culture in Queensland.
Insecticides and Fungicides.
Dairy Salts.

1911—Soils of the Upper Burnett (in collaboration with G. R. Patten).
Analysis of Fertilizers.
Wheat Culture in Queensland.
Plants Poisonous to Stock (Native Fuchsia).
Growth and Cultivation of Sugar-cane.
Banana Manuring Experiments.
Testing of Farm Seeds (in collaboration with G. H. Gurney).

1912—Some Queensland Mangrove Barks and Other Tanning Material.
Determination of Moisture in Butter (in collaboration with Frank Smith).
Notes on Dipping Fluids.

1913—Complete Fertilizers for Farm and Orchard.
Balanced Rations—Feeding on a Scientific Basis.
Soils of the Stanthorpe District (in collaboration with G. R. Patten).
Cultivation and Manuring of Orchards.
Stock Foods.
Prickly-pear—Analysis of Varieties.
Testing of Farm Seeds.

1914—Agricultural Lime and Limestone in Queensland.
Manuring of Bananas.
Dipping Fluids—Determination and Efficacy.

1915—Poisonous Plants (Dysphania).
Grass Dangerous to Stock (*Eleusina indica*).
A New Dipping Fluid (in collaboration with Frank Smith).

1916—Tannin Contents of Queensland Barks (in collaboration with A. T. Jefferis).
Laws relating to Fertilizers.

1917—C.c.s. in Cane.

1919—Lime and Magnesia in Queensland Soils.

1921—Digestibility of Fodders.
Cotton Seed as a Stock Food.
Mixing of Fertilizers.

1923—Elementary Lessons on the Chemistry of Farm, Dairy, and Household (Second Edition).

1924—Complete Fertilizers for Farm and Orchard.

1925—Fertilizer Don'ts.

1926—Mineral Deficiencies in Pastures.
Influence of Composition of Foods on the Health of Stock.

1927—Water for Irrigation and Stock.

1928—Stock Foods (Second Edition).
1929—Malnutrition.
1931—Stock Foods (Third Edition).
Nutrition in Sheep (in collaboration with W. R. Winks).

For many years Mr. Brünnich has been a member of the Royal Society (Queensland), of which he is a past president. In 1905 he was elected a Fellow of the Institute of Chemistry of Great Britain and Ireland, and is a foundation member and Fellow of the Australian Chemical Institute.

In his younger days, Mr. Brünnich was an enthusiastic volunteer and commanded a squadron of Light Horse with the rank of Captain. His former C.O., Major-General Spencer Browne, C.B., regarded him as a very useful member of a staff of outstanding merit to whom the efficiency of the Queensland Mounted Infantry and the Queensland units of the Australian Light Horse, which has become traditional, was largely due.

AN APPRECIATION.

A member of the Agricultural Chemistry Branch of the Department of Agriculture and Stock has contributed the following appreciation of his old Chief:—

As one associated with the Agricultural Laboratory for a lengthy period of years, I feel it a duty, as a tribute from the present staff, and officers who have passed through his hands, to pen a résumé of the long, faithful, and meritorious record of our Chief, Mr. J. C. Brünnich, after a strenuous thirty-four years of public service.

Formerly connected with the Colonial Sugar Refining Company at Homebush, Mackay, as chemist, he was appointed in 1897 as the first Chemist to the Department of Agriculture at Gatton College, combining also the duties of Science Master. He early made an investigation into the pollution of rivers and streams by effluents from several sugar mills, and advised on its prevention.

The successful settlement of the Lockyer district may be attributed in some measure to his work on the soils of the Gatton College Farm. His foresight was exceptional, for as far back as 1899 he recommended a thorough and exhaustive analysis of the soils from different parts of the State, and a year later stressed the need for extensive work on fodders, grasses, plants poisonous to stock, exudations of trees—e.g., gums and resins, essential oils, tanning materials, and prospective natural deposits of manurial value.

Experimental work with prickly-pear spray solutions and inks for meat branding was carried out, and a survey made of the natural grasses of the State under varying conditions. In this year he attended an agricultural conference at Bundaberg with regard to the testing of Queensland wheats, and about this time instituted a formula for a cattle dipping fluid, which forms the basis of many now being used with good results.

Grazing and agricultural interests were well served by him, and the pastoral possibilities of Queensland were demonstrated by his chemical work.

That Queensland maizes were richer in protein compared with imported grain was shown by him in 1904, a matter of importance with the advent of scientific stock feeding, which has so much progressed in recent years. Of particular interest also is his analysis of *Rhizopora mucronata* and *Cenops condolleana*—Queensland species of barks containing 48 per cent. and 42 per cent., respectively, of tannin—and his suggestion that our mangrove barks might be used for the manufacture of "Cutch."

In 1905, in addition to his other work he was appointed Supervising Chemist to the Bureau of Central Sugar Mills, thus performing useful services to the sugar industry. His work on wheats, including the lipoid phosphorous content of grain, was performed in this year.

In the following year the laboratory was transferred at his suggestion to Brisbane, near the present Public Library, and besides increased routine work he made the important recommendation as to feeding molasses with sorghum, sweet potato vines, and such other foods as are liable to contain cyanogenetic glucosides as a possible antidote for the latter. This came about through his extensive reading, being in the first instance proclaimed through the Nebraska Experiment Station.

Appearing first in the "Queensland Agricultural Journal" as a series of articles, his book, "Elementary Lessons in the Chemistry of the Farm, Dairy, and Household," is now recognised as a standard work.

Mr. Brünnich was ever anxious to increase the commercial value of the laboratory, and in 1908 hops, malts, and barley from Queensland maltsters claimed his attention with this end in view.

About this period, too, his outlook envisaged the deep thought and work of the latter-day soil research chemists, for in 1910 he recommended that a soil survey, even on a small scale, be carried out, and a few years later advised that " . . . . the

most important work is undoubtedly the extension of knowledge of the soil types of new districts . . . the gradual soil survey of the settled districts and the study of the changes taking place in our soils after years of cultivation and cropping.''

Important banana manuring experiments, analysis of the soils of the Upper Burnett district and Wallum soils were initiated twenty years ago, and later soil effects in connection with disease in pineapples gone into. The year 1913 saw him responsible for trials with wheat as regards their manuring and milling, also the baking qualities of flour produced therefrom, and he showed that Queensland soils contained sufficient sulphur for all requirements, whilst chemical advice was given to such industries as brewing, canning, cordial, vinegar, and tanning.

For the last ten years, soil acidity and base exchange determinations have been made for future reference, and interesting work done on the Atherton-Tolga Tableland soils, regarding depletion of mineral plant foods and their deficiency in potash reserve. Besides, valuable and valued help has been given the cotton industry and Forestry Department.

At the Conference for the Advancement of Science in Melbourne in 1921, Mr. Brünnich delivered a paper on ''Digestibility of Fodders,'' the outcome of experimental work under his guidance, creating considerable interest thereby.

In 1922 he pointed out that the soils of the Dawson River Irrigation Scheme compared very favourably, from a chemical and physical viewpoint, with those of the older established Yanco and Murray River settlements; while his analyses of samples from the Coominya Soldier Settlement emphasises forcibly the need for chemical investigation at least before settlement. For some years he has been a member of the Cattle Tick Dip Committee, which is responsible for experiments on the tick pest, under the aegis of the Commonwealth Council for Scientific and Industrial Research. His work in conjunction with factories resulted in an improved pineapple pack in 1922.

Conferences of Agricultural Chemists—Melbourne, 1921, and Sydney, 1924—were attended by him, resulting in uniform Bills relating to stock foods, fertilizers, insecticides, and pest destroyers being formulated. He was the first to suggest the use of dichlorobenzene, which now finds successful application, for the destruction of the cane grub.

In 1924 the laboratory was further transferred to the Departmental Buildings, and is laid out on most modern lines, being a credit to Mr. Brünnich and the Department. Experiments regarding pasture improvement were begun in 1926, and are still progressing, and work for the Council for Scientific and Industrial Research in the matter of grasses and edible shrubs was carried out, since when Mr. Brünnich put forth the suggestion for the use of Nauru phosphate as a lick or incorporated in such as an adjunct in nutritional problems in so far as the phosphoric acid deficiency of the State's grasses, as proved by repeated analyses, are concerned. In this matter he was ably supported by the late Professor T. Brailsford Robertson.

Latterly he has been engaged upon experiments on the feeding of dairy cows. Consequently there does not seem a phase of agricultural, pastoral, or dairy work that he has not touched upon in its chemical aspects. His analyses are quoted in many scientific journals, particularly by Dr. E. J. Russell, of the famous Rothamstead Experiment Farm. Again, on the occasion of the visit of Sir Arnold Theiler a few years ago, that eminent scientist expressed agreeable surprise and made appreciative reference to the amount of valuable data obtained by Mr. Brünnich in the course of his work.

He has at times conducted lecture tours throughout Queensland, is a Fellow of the Institute of Chemistry of Great Britain and Ireland, Fellow of the Chemical Society, a foundation member and Fellow of the Australian Chemical Institute, a past president of the Royal Society of Queensland, an examiner in conjunction in Sugar Chemistry for Technical Colleges, besides being a member of various State and Commonwealth Technical Committees for scientific and economic advancement.

His pen has been used prolifically in preparing pamphlets and articles, mainly through the ''Queensland Agricultural Journal,'' for the dissemination of chemical knowledge. Mr. Brünnich's ''knowledge complex'' must be very involved, and at the same time capable of high dissociation, owing to the extraordinarily wide range of advice which he has been called upon to give in answer to the many and varied questions of a chemical nature with which he has been beset.

He is tenacious of and emphatic in his opinions, withal modest and retiring. Although no elaborate experiments have been carried out recently owing to a circumscribed scope due mainly to lack of finance, still the work he has been instrumental in performing will prove, and is even now proving, very valuable to the younger chemists working in the interests of Queensland and Australia through the Departments of Agriculture, and well might the foundation stone of the chemical progress of the Agricultural Department be deeply inscribed ''This stone was laid in 1897 by Mr. J. C. Brünnich, F.I.C., F.A.C.I., Agricultural Chemist.''

STOCK FOODS.

By J. C. BRÜNNICH, F.I.C., F.C.S., F.A.C.I., Agricultural Chemist.

PART II.

The wealth of our State is based to a very large extent on the number of our live stock, and the welfare of the stock again depends entirely on the feeding; therefore the question how, when, and what to feed is of greatest importance to farmer and grazier.

All our wool, meat, hides, dairy produce, eggs, and the labour performed by horses and cattle are the result of feeding. All our live stock can be regarded as living factories producing from the food consumed products useful to man.

As a large proportion of our stock in Queensland is pasturing on natural herbage, the feeding under normal conditions is therefore more or less outside the province of agricultural science; but in times of scarcity, which periodically occur, hand feeding must be resorted to, and at such times it is of the utmost importance to have some knowledge of the composition of various stock foods, which have to be used in connection with poorer roughage to keep stock in good condition.

In this paper Mr. Brünnich discusses stock foods and their values, and his notes will be accepted by readers as a valuable contribution to our information on important points in animal husbandry.—ED.

Comments on Various Stock Foods.

Grass.—Natural grasses are without doubt the cheapest of stock foods, but, as we can see from the analyses, ordinary pasture is of very varying composition, and therefore stock which depend on natural pasture alone are only for short periods of the year "on clover."

I cannot refrain from quoting here an extract from a lecture on stock foods, delivered at the Beenleigh and Rockhampton agricultural conferences by the late Professor E. M. Shelton. The remarks made over thirty years ago by this keen observer of wide practical experience apply equally to the present day, and put the position of dairying and grazing on natural pasture in a nutshell:—

"Our Great Reliance on Grass.

"The natural grass in Queensland is so abundant and unfailing, and, as compared with artificial forage, so easily got that stockowners outside the towns complacently regard it as sufficient food for all classes of stock at all times and seasons. It is only when protracted drought becomes calamitous that stockowners begin to realise the dangers of complete reliance upon natural supplies of stock food. Even during favourable seasons the annual loss, from the poverty of wild grasses during the winter months, must in the aggregate be enormous. During much of every winter our herds are losing the flesh accumulated during favourable summer months, thus literally converting flesh into nearly worthless manure, a process that can hardly prove profitable to the stockraiser. Let this be understood: good grass is the cheapest and best single stock food. No form of artificial food, whether grain, roots, or residual products, can compete in cheapness with natural herbage as a source of beef, mutton, and the other products of feeding; but to rely wholly and entirely upon

the spontaneous herbage is to fail in obtaining the principal advantages derivable from such natural pastures. By piecing out the failing grass with hay, silage, or green fodders, we keep our animals in the highest working condition with that **small amount** of feed that every stockman knows is required to maintain vigorous, thick-fleshed animals up to their greatest efficiency. After the animal once becomes reduced in flesh, let the owner attempt to bring it up again to its condition of greatest usefulness as a milker or meat-making machine, and he will have it brought home to him, in a thoroughly practical way, how great his loss has been through sparing the feed. **Other things being equal, the animal that consumes the most feed gives the largest profitable return for feeding.** A hint of why the full-fed animal returns the largest available profit is furnished by our knowledge of the ultimate use to which food is put. It is plain that food is applied to two purposes: it goes to make up the loss of the animal machine itself through constant wear; and it is applied towards the production of the object of feeding—milk, beef, wool, &c. It is clear also that if the animal gets of food only sufficient to supply the constant wear and tear incident to existence, the feeder gets nothing in return for his feeding. But if he gives in quantity beyond the vital demands of the animal, that surplus will, more or less, go to the production of the valuable article which is the principal object of his feeding. Profit always comes out of the excess feed, and not from the small amount that is really required to maintain existence."

Quite excellent hay can be made from our natural pasture grasses, and an analysis of "bush hay" over fifteen years old showed it to possess a fairly high feeding value.

Unfortunately in good seasons enormous amounts of grass go to waste, as all the grasses, after being dried up, exposed to dews and scorching sun, rapidly deteroriate, losing colour, flavour, and quality, and have but little feeding value, so that they are only fit to be burnt off.

There is but little difference between the food values of the various most popular cultivated grasses—Paspalum, Canary grass, Rhodes grass, Sudan grass, and others—yet the variation in the composition of the sample, according to season, locality, and age of crop in each species, is very much greater than the variation in composition from one species to another. It is quite obvious that it is impossible to judge the value of any grass by a few isolated analyses.

There are a few grasses like Couch grass (*Cynodon dactylon*) and Prairie grass (*Bromus unioloides*) which stand out on their own on account of high food value.

The great nutritive value of young grass in its earliest stages of growth, and only a few inches high, has become recognised in England and elsewhere recently, and caused the introduction of a new system of depasturing grass lands.

In my Annual Report of 1914, where I gave the analyses of a large number of grasses from various pastures, I showed the higher food value of the young growth, and remarked on the loss of nutritious value when grasses are allowed to seed. As a matter of fact, the young shoots of grasses, about 4 to 6 in. high, are equal to many valued concentrates with regard to the protein content, and this accounts for the rapid recovery of cattle and sheep grazing on pasture, after getting a few showers of rain, following spells of dry weather.

The **new system of grass land management,** now being most successfully practised in England and many other places, is based on a combination of the following factors:—

(1) Liberal use of intensive and balanced fertilizers, followed by successive top dressings with nitrogenous fertilizers.

(2) Close rational rotational grazing off by stock under a carefully planned system.

(3) Systematic thorough cultural treatment.

Grass and herbage kept short contains a much higher amount of digestible protein than grass grown under the old methods of grazing. Young shoots of grass, from 4 to 6 inches long, contain as much and frequently more protein than valuable concentrates, grains, and legumes.

Such young, rich grass can only be secured by this system of **rotational grazing.** As soon as the grass reaches this height of 4 or 5 inches, sufficient stock must be put into the paddock to ensure complete grazing off in a few days, which requires at least twelve cows per acre. Pastures should get similar treatment as other fodder crops, cultivation and application of complete fertilizers supplying nitrogen, phosphoric acid, and potash.

To ensure good, uniform growth of grass, the land after grazing off must be harrowed to break up and spread the droppings, to remove any dead growth, break up any mat of dead herbage, aerate the soil, &c., and only after the pasture has been cleaned up the necessary fertilizers are applied.

If at any time the growth gets out of hand a mowing machine must be used to keep the grass short. How far such a system could be applied extensively in Queensland is, of course, problematic. There should be no difficulty in good dairying districts; a great increase of clovers in the pasture will be the immediate result, and should give a much increased yield of milk. Even in pastoral holdings the cutting up of areas into smaller paddocks, giving each periods of rest between grazing off, should be found advantageous.

Roots and Other Succulent Stock Foods.

In Europe, Canada, and also in New Zealand, for the feeding of dairy stock, in addition to a rich pasture containing clovers, root crops play an important part. In our State we can supplement our natural pasture with the more valuable crops of lucerne and maize, and to some extent with pumpkins.

Mangels are the most watery of stock foods. Many of the Queensland-grown samples have a very low feeding value, much lower than the value obtained in root-crop-growing countries where the quality with regard to protein contents has been steadily improved by careful selection of seed. However, a special variety or cross of mangels, the "sugar mangel," several samples of which were analysed from the crop grown on our State farms, from seeds imported by Sir Matthew Nathan from the Cambridge School of Agriculture, gave as much as 1.7 per cent. of crude protein, making them a valuable food, as compared with our ordinary mangels containing only 0.6 per cent. of protein. Mangels and beets should not be fed to male sheep for long periods, as they are likely to cause urinary troubles.

Pumpkins are greatly relished by cattle, horses, and pigs, and are rather more nutritious than mangels. The seeds contain much protein and oil and should therefore not be wasted. Pumpkins are preferably fed raw to pigs. The seeds act as a slight vermifuge; fed in excess, however, the seeds may cause digestive troubles. Cases have been reported that pumpkin seeds caused trouble when fed to poultry.

Potatoes and sweet potatoes contain about twice as much dry matter as mangels. They have a good food value, but as a rule have too high a commercial value as human food to make them profitable for feeding of stock.

Sweet potato vines are a very nutritious, succulent food. They must be fed with caution to pigs, as in a few instances we found a hydrocyanic acid yielding glucoside in these vines. Any danger, however, is minimised by sprinkling a little molasses over the vines before being fed.

Silage.—One of the most economical means of preparing succulent foods for dry seasons and general use is by means of a silo. The most suitable crop for this purpose is maize. Crops of saccharine and non-saccharine sorghums may also be used; in fact, any succulent green crop may be utilised for the making of silage. Sunflowers, according to American and Japanese reports, make an excellent ensilage. A very fine sample of silage once submitted for analysis was made from wheat, thistles, and mustard. Another good sample was made with alternate layers of maize and prickly-pear. Leguminous crops, like lucerne, make a poor foul-smelling ensilage. The process of fermentation taking place in the silo has an influence on the nutrients in the food; some of the carbohydrates are lost, as well as small amounts of proteins are decomposed; again the digestibility of the remaining protein is somewhat lowered. These losses, however, are fully compensated by the succulence and palatability of the ensilage. No better ration for milking cows could be found than a mixture of lucerne hay and maize ensilage, with small amounts of bran and pollard or oil cakes.

Hay.—The simplest and best way to preserve green fodders, which has been practised from time immemorial, is to make them into hay by drying in the air in the sun. The moisture can be reduced to 8 per cent., and all further fermentation is arrested. If the hay is not properly dried, detrimental changes can take place during storage. The quality of the hay depends: (1) on the quality of the raw material, (2) on losses and changes during the drying, and (3) on changes which may take place during storage.

Lucerne hay is an almost ideal food for dairy stock. When cut very young, before flowering, the nitrogen ratio is a little too high, but the ratio is lowered when cut in full flower.

Straw.—When plants mature a large proportion of the organic compounds, both nitrogenous and non-nitrogenous nutrients, are transferred from the green portion of the plants to the seeds. At the same time all stems and stalks become harder as the cellulose of the fibre becomes more and more lignified, and but small amounts of proteins, fat, and nitrogen-free extracts remain in the straw or chaff when the ripening of the seeds is completed. In samples of oat straw, cut at various periods of maturity, the amount of crude protein fell steadily from 10.1 per cent. to 4.3 per cent., and at the same time the crude fibre was increased from 29 per cent. to 50 per cent. The lignification of the

cellulose or fibre in straw causes, when used as a feed, a great loss of energy for mastication, and consequently from 70 to 80 per cent. of the available digestible nutrients are used up to supply the energy required for mastication and digestion, and only from 20 to 30 per cent. of the nutrients are available for maintenance and production.

Cereal straws are very poor stock foods, and should only form a small portion of the ration. Ruminants can be given larger quantities than horses.

Leguminous straws are of considerably better food value, but not very palatable to stock—especially to horses.

Chaff.—Although the term **chaff** is elsewhere accepted as meaning the husks, or outer envelopes of cereal grain, with any light debris that may arise in threshing, in Queensland the term indicates hay or straw cut up into short lengths.

Unfortunately the chaffing of hay and straw tends to hide any foreign matter that such material may contain; further, the term **hay** should only be applied to any dried or cured cereal, grass or legume cut **before complete ripeness,** and in which the grain or seed has not been fully developed or removed. **Straw** implies any dried **ripe or mature** material from which the seed or grain has been removed by any process.

Chaff is liable to contain a good deal of rubbish such as sand, earth, dust, weed seeds, moulds, and spores of fungi, &c., which can cause serious troubles, and therefore if poor qualities of chaff have to be used, in case of necessity, such chaff should be scalded or steamed before being fed. A good many samples of chaff have come on the market lately which contain a large amount of stalks, leaves, and seeds of the thorn apple (*datura stramonium*), a highly poisonous weed. Such chaff is very dangerous to stock, and cannot be used as a feed, and the sale of any chaff or hay containing this weed is an offence under the Stock Food Act. Farmers should take particular care to prevent the spreading of this noxious weed.

Grains and Seeds.—The composition of the grains and seeds depends largely on the state of ripeness when harvested. Immature seeds contain more protein and mineral matter and less nitrogen-free extract than ripe ones. The quality of all grains is also influenced by soil conditions, manuring, and season.

Oats may be considered the most valuable of cereal grains, and have no equal for the feeding of horses. They are a very good milk-producing food, if they can be obtained cheaply enough. Ground or crushed oats are excellent for calf rearing, as a supplement to skim milk.

Barley is particularly useful for fattening all stock, and a standard food for pigs. An excellent ration for breeding pigs is made up from 30 per cent. barley meal, 30 per cent. maize meal, 35 per cent. pollard, and 5 per cent. meat meal or blood meal. The latter promotes growth and can be left out during fattening period, increasing at the same time the amount of barley and maize meal.

Barley grain containing too much protein for malting purposes is particularly useful as a stock food.

Wheat.—On account of its price, wheat is only rarely used for feeding of stock; low-grade and damaged wheat is a valuable food for poultry, and the shrivelled wheat generally contains more protein than first grade plump wheat. Fresh wheat, whole grains, are dangerous to stock, and if used for fattening of cattle and pigs should be crushed

or ground. The by-products of milling wheat, **bran** and **pollard,** are of particular value. Bran, the outer coating of the wheat kernel, is rich in digestible protein, digestible carbohydrates, and fat, and contains comparatively high amounts of mineral matters, phosphoric acid, magnesia, and potash, but is poor in lime. Bran has a beneficial laxative effect, which is increased by giving it in form of a bran mash.

Maize is suitable for all stock, but on account of its hardness not so easily digested as other grain, and therefore preferably fed in ground form as **maize meal.** Maize, of all the cereal seeds, contains the least amount of lime, and its proteins are very deficient in lysine. Maize is chiefly a heat and fat producing food.

It is of interest to note that the protein content of maize has been gradually decreasing year by year in Queensland. Twenty-three years ago a large number of different varieties of maize were analysed and found to contain high amounts of crude protein, averaging 13.5 per cent., and ranging from 12.1 to 13.8 per cent. An imported maize from the Argentine, containing 10.7 per cent. of crude protein, gave, after being grown on our State farms, 12.9 per cent. At that time I claimed our Queensland-grown maizes to practically equal wheat as a food for poultry, &c. Since that time, however, a change has taken place, and the average of many samples analysed during the last three years was only 9.5 per cent. of crude protein, varying between 8 and 13 per cent. It is quite evident that our present maize is more valuable as a material for the production of cornflour and glucose, or production of power alcohol, than as a stock food. Maize grown for stock-food purposes should be from specially selected seeds rich in protein. Of a very high food value are the by-products from maize, viz., maize germ meal, polly meal, maize gluten meal, &c., which were on the market some years ago, but are at present not procurable, as they are eagerly bought up in the States where the factories utilising maize exist.

Leguminous Seeds.

Beans, peas, cowpeas, &c., are very nutritious food, containing large amounts of protein, and can be used for all stock. If fed in large amounts they may cause constipation and also thickening of the blood, and therefore should not form more than one-fifth to one-quarter of the grain ration. Leguminous seeds should be given either ground, crushed, or soaked. A few species of leguminous seeds, like Java bean; are poisonous, containing a hydrocyanic yielding glucoside.

Oily Seeds.

Linseed, slightly crushed, is an excellent calf food, as it contains a large amount of fat. The by-product from the manufacture of linseed oil—the linseed cake—is one of our most valuable concentrated stock foods, but unfortunately the quality of linseed imported for the manufacture of oil is very much lower in its protein content than the linseed used in Europe, our linseed containing only 18 per cent. of crude protein, as compared with 24.2 per cent., the average in England. Again our cake contains only 25.5 per cent. of protein, as compared with European cake containing from 29.5 to 35 per cent.

Linseed cake used to contain from 9 to 10 per cent. of fat, and this made it valuable as a calf food to replace the fat lost in the milk on separating, but a new process of manufacture brings the oil contents down to 2 per cent. and less, and makes the cake of much less value for calf feeding. All linseed contains more or less of a hydrocyanic acid

yielding glucoside, and must be therefore used with caution and never fed in excess. Several cases of death among calves have been reported, due to giving excessive amounts of linseed meal.

Sunflower Seeds and **Sunflower Oil Cake,** if procurable, are excellent foods, suitable for all kinds of stock.

Peanuts or **Earthnuts** are a suitable feed for cattle, sheep, and pigs. If given in excess to pigs they produce soft fat and inferior pork.

Peanut Cake is the richest of all our oil cakes. The vines of the peanuts may be collected and cured into a nutritious palatable hay. Peanut hulls ground are frequently used for the adulteration of stock foods; they have very little food value, on account of the high amount of fibre.

Cotton Seed is always used in Queensland in form of cotton seed meal, after extraction of the cotton seed oil. If the hulls are not removed before crushing **undecorticated meal** is obtained, which is of much less value than the **decorticated meal,** which contains no hulls. Undecorticated meal, on account of the indigestibility of the hulls, is a most constipating food, and therefore used with advantage when feeding very lushy grasses, whereas decorticated meal is a valuable concentrate, suitable for cattle and sheep, but **not for pigs.** It is a good milk-producing food, and also good for fattening cattle and sheep, fed in moderate amounts.

Coconut Cake or **Copra Cake.**—The by-product of the manufacture of coconut oil is a very palatable and pleasant-smelling concentrated food, suitable chiefly for dairy cows, but also for general use for cattle, sheep, and pigs. The coconut cake should be soaked before being used, as it swells very considerably on absorption of water. When fed to dairy cows it helps to produce a good firm butter, whereas linseed meal tends to soften the butter, and cotton seed meal again produces a hard tallowy butter, of light colour and poor flavour.

Other By-products and Various Foods.

Meat Meal.—The by-products of meatworks sold under various trade names, as meat meal, dried liver, and lights, bovaline, mutton protein, protein meal, ox-a-vita, &c., are valuable concentrated stock foods, and small amounts can form part of the rations for dairy cows, pigs, and poultry. Meat meal particularly promotes growth, as already explained.

Fish Meal is a very valuable nutritious food obtained as a by-product in the process of curing and canning fish. It should contain about 50 to 56 per cent. of protein and not more than about 4 or 5 per cent. of oil. If too much oil is left in the meal this food would give a pronounced fishy taint to the flesh, fat, and milk of the animals fed with such meal. Fish meal contains about 20 per cent. of ash, chiefly phosphate of lime, and is therefore of particular value as a pig feed, used, of course, in small amounts, from 1 to 3 oz. per head according to age and size.

Cod Liver Oil is an easily digested fish oil of high nutritious value, particularly rich in vitamins and therefore used for young animals to promote a healthy growth. It is of particular value, given in small quantities to calves reared without milk or skim milk.

Blood Meal made from dried blood is another highly concentrated food, of similar use as meat meal. Ordinary dried blood, in coarse granular form, should never be used as stock food, as on account of the high nutritious qualities, inflammation of the stomach lining sets in where the hard grains come in contact. Serious injuries to pigs and poultry have been caused when feeding such coarse dried blood. Proper blood meal for stock food should be as fine as flour, and is highly digestible, and therefore should be used in small quantities only, well mixed with other foods.

At the Yeerongpilly Stock Experiment Station, when carrying out feeding experiments with sheep, we found that of the crude protein in somewhat coarse blood only 61 per cent. was digested, whereas in the fine blood meal 89 per cent. was digested.

Molasses, the by-product of the manufacture of cane sugar, is palatable and much relished by stock. The feeding value consists entirely of soluble readily digested sugars, and molasses is therefore a heating and fat-producing food and supplies no protein whatever. Amounts from 2 to 3 lb. daily can be given to horses and cows, sprinkled on roughage, which is made more palatable. Molasses act as an antidote against hydrocyanic acid poisoning, and therefore foods like young sorghum, Sudan grass, and sweet potato vines, which may contain a hydrocyanic acid yielding glucoside in dangerous amounts, should be sprinkled with molasses before being fed to stock.

One of the newer concentrated foods on the market abroad is **Dried Yeast,** a by-product of breweries and other fermentation industries. As soon as power alcohol factories are properly established, this valuable product will become available. Dried yeast contains about 50 to 55 per cent. of protein, no oil, about 30 per cent. carbohydrates, and 10 per cent. ash. It also contains a large amount of vitamins, and is of great value as a food for pigs, but, like all other foods very rich in protein, must be given in small amounts mixed with other foods, in quantities from 1 to 3 oz. per head.

Compressed Concentrated Foods.—Hand feeding of sheep, more especially of large mobs of starved animals, has always been a big problem, as it is almost impossible to provide sufficient troughing to give all animals an equal chance, and the weak ones have generally to go without food. The use of troughs also leads to bolting of food and general waste. As sheep can pick up grain from the ground as well as poultry, our sheep expert, Mr. W. Brown, recommends to dribble grain like maize and barley in a thin line on the circumference of large circles, which gives every sheep a chance to pick up a few grains. At present compressed concentrates are on the market which are particularly suited for hand feeding of sheep. Amongst the available foods we find linseed nuts, cotton seed, treacle cubes, and kubettes for sheep. These nuts should not be too large (cubes from ½ to ¾ inch) and should if possible be made from a mixture of various grains, meals, and by-products in order to give the animals a variety of proteins, so beneficial to the general health. Amongst the available foods are linseed nuts (a form of linseed cake broken up into small pieces of suitable size for feeding of sheep), cotton seed, and treacle cubes. Each of these products is made from a single by-product, and contains rather too high an amount of protein, whereas kubettes are made from a very large number of products containing an amount of protein equal to ordinary cereal grain, and are undoubtedly the most suitable food for

hand feeding of sheep at present on the market. The manufacture of such compressed concentrates should be very much extended, and if offered at reasonable cost will lead to large consumption throughout the year, because there are many localities where the addition of a little concentrate in certain seasons would be highly beneficial to grazing sheep.

Licks.—In many districts the supplying of licks containing **salt, lime,** and **phosphates** to stock is an absolute necessity, and nearly everywhere such licks can be given to benefit the health of the animals.

Fine Bone Meal can be mixed with coarse salt and forms a good lick, as long as care is taken that the bone meal is of good quality and specially sterilised by heating with super-heated steam. Ordinary bone meal as used as fertilizer should on no account be used. A good substitute for bone meal, supplying large amounts of lime and phosphoric acid, is **finely-crushed Nauru or Ocean Island phosphate.***

The licks should always be placed in sheltered troughs, preferably of the continuous self-feeding type recommended by our Department. A mixture of equal parts of coarse salt and phosphate makes a cheap effective lick. Small amounts of sulphur, adding, say, 2 lb. of flowers of sulphur to every 100 lb. of salt and phosphate mixture, will be found beneficial. An addition of the same amount of carbonate of iron, or of sulphate of iron, will improve the health of stock in many districts.

As the use of licks, as recommended, has already given excellent results in many localities, I will herewith give a few of such mixtures.

For sheep—

2 bags (187 lb.) Nauru phosphate,
1 bag (187 lb.) coarse salt,
20 lb. Epsom salts, well mixed together.

When feeding in very dry areas with constipating coarse grass or hay the amount of Epsom salts can be increased to 50 lb. If sheep are supplied with very saline water, the amount of salt given in the lick must be cut out or very much reduced.

For cattle similar licks can be used, but some owners prefer bone meal; only finely-ground steamed bone meal of the best quality should be used, and mix—

200 lb. of bone meal,
100 lb. coarse salt.

Anyone desiring a complete medicated lick for cattle or sheep can use the following:—

200 lb. steamed bone meal, or crushed Nauru phosphate,
100 lb. coarse salt,
50 lb. finely ground limestone,
15 lb. Epsom salts,
5 lb. sulphate of iron,
5 lb. flowers of sulphur,
4 oz. iodide of potassium.

A good lick for pigs is the following mixture:—

20 lb. hardwood ashes and charcoal,
15 lb. finely crushed limestone,
40 lb. steamed bone meal,
20 lb. coarse salt.

*Reports of ill effects supposed to be caused by feeding of Nauru phosphate are absolutely without foundation. Continued heavy use of Nauru phosphate licks for over six years on several stations gave excellent results.

Another lick for pigs, recommended by the Staffordshire farmers, is made as follows:—

35 lb. coarse salt,
15 lb. flowers of sulphur,
15 lb. steamed bone meal,
20 lb. crushed limestone,
15 lb. wood ashes with charcoal,
5 oz. potassium iodide.

"The Stock Foods Acts, 1919 to 1928."

Queensland possesses in the Stock Foods Acts a piece of advanced legislation for the protection of all buyers of stock foods, which is far ahead of any similar Act in other Australian States, and quite up to the standard of such Acts existing abroad. This legislation, which at first met with some opposition on the part of the sellers, as it was considered to harass trade unnecessarily, is now welcomed by genuine manufacturers and dealers as a protection against unfair competition by unscrupulous traders, and puts the manufacture and sale of all stock foods on a sound basis.

Under the Act all wholesale sellers of any mixed concentrated or prepared stock food, which includes all kinds of meals and foods for stock prepared in whole or in part from one or more than one kind of grain or oils or juices of meats or other source, and any condimental patented or proprietary stock food claimed to possess nutritive as well as medicinal properties, must every year submit samples of such foods to the Under Secretary, and at the same time state the composition and food value of such samples. Certain stock foods must be labelled, stating on the labels the number of net pounds in the package, the distinguishing name or trade mark of the food, name and address of seller, and chemical analysis of the food, giving minimum amounts of crude protein and crude fat, and maximum amount of crude fibre. The seller must give at the time of sale an invoice certificate, giving among other things the gross weight, warranty about composition and amounts of foreign ingredients, &c. Upon the sale of hay, straw, and chaffs made therefrom, and mixed chaff, the invoice must specify each component and in case of mixed chaff and straw chaff the package must be labelled M.C. and S.C. respectively. Unfortunately the great majority of our stock food buyers pay but little attention to labels and invoice certificates, which are frequently torn up and thrown away, and therefore do not derive the full benefit of the Stock Food Acts. The monetary value of any stock food can be enormously influenced by variation in the amount of protein and fat contained in the food, and therefore the stockowner, poultry farmer, &c., should carefully study the labels of various samples and compare them with the prices, in order to buy most economically.

It must be clearly understood that the feeding value of any food cannot be entirely judged by its analysis; other factors as palatability, composition of the protein, vitamin contents, freedom from impurities, &c., must be taken into consideration, besides its relative cost, and therefore the old saying that "**the master's eye is the best food**" will always remain true.

Feeding Standards.

For the guidance of the stockowner in choosing and making up suitable rations, based on the composition of the various stock foods, it is necessary to draw up feeding standards, stating the amounts of

each class of nutrient necessary to be provided in the rations for farm animals of all classes and ages, to keep them in best condition and obtain a maximum of production. During the last century many of such standards were drawn up by eminent men like Wolff, Atwater, Armsby, and Lehmann. Table III. gives the latest **standard rations** according to Dr. O. Kellner, the Director of the Mockern Experiment Station (Germany), based on the amounts of dry matter, digestible protein, and starch values required for the rations.

How to Make up Rations.

As a basis for the making up of rations we must take into consideration the fact that a ruminant can eat daily an amount of fodder which contains dry matter equal to 2½ to 3 per cent. of the body weight of the animal. This amount is for full-grown animals; for maintenance and at rest, only from 1½ to 2 per cent.; and for heavy milkers up to 3½ per cent. of the live weight.

Feeding of Cows.

A cow from 750 to 800 lb. live weight, yielding daily 2½ gallons of milk, would require, as calculated from Table III., per day a ration containing—

Dry Matter.	Digest Protein.	Starch Equivalent.
23 lb.	1·65 lb.	9 lb.

For convenience and rapid comparison of all stock foods, the last two columns (16 and 17) of Table I. show the amounts of stock foods in pounds required to supply 1.65 lb. of digestible pure protein and 9 lb. starch equivalent.

We will start a ration with **good lucerne chaff**—

	Dry Matter.	Digest Protein.	Starch Equivalent.
25 lb. of lucerne chaff contains	22·6	2·58	7·45

which would supply an excess of nitrogen and not sufficient starch equivalent, which is quite apparent from columns 16 and 17, which show that only 16 lb. would be required to supply the necessary nitrogen and 30 lb. to supply the starch equivalent on account of the narrow nutritive ratio (column 12) of 1 ÷ 3.6, whereas we want a ratio of about 1 ÷ 5.

By reducing the amount of lucerne chaff and substituting the same amount of **wheat hay chaff** we get:

	Dry Matter.	Digest Protein.	Starch Equivalent.
13 lb. of lucerne chaff	11·7	1·34	3·9
13 lb. of wheat chaff	11·4	0·19	3·8
	23·1	1·53	7·7

The amount of protein is lowered a little too much and we have not yet sufficient starch equivalent. We must reduce the amount of chaff and add a more starchy food like **maize meal**, and make up the following ration, which brings the ration up to standard.

	Dry Matter.	Digest Protein.	Starch Equivalent.
13 lb. of lucerne chaff	11·7	1·34	3·9
10 lb. of wheat chaff	8·8	·15	2·9
3 lb. maize meal	2·6	·14	2·1
	23·1	1·63	8·9

If we start as basis of a ration with a **good bush hay** we find in:

	Dry Matter.	Digest. Protein.	Starch Equivalent.
25 lb. good bush hay	23·0	·48	·8·2

This ration is very deficient in digestible protein, and slightly deficient in starch equivalent.

If we replace 8 lb. of hay by 8 lb. of **maize meal** we obtain—

	Dry Matter.	Digest. Protein.	Starch Equivalent.
17 lb. bush hay	15·6	·32	5·6
8 lb. maize meal	6·9	·37	5·6
	22·5	·69	11·2

The ration is still very deficient in protein, and too high in starch equivalent, maize being a one-sided starchy feed, and we must therefore substitute much more nitrogenous concentrates like cotton-seed meal or linseed meal.

	Dry Matter.	Digest. Protein.	Starch Equivalent.
17 lb. bush hay	15·6	·32	5·6
4 lb. maize meal	3·5	·19	2·8
2 lb. bran	1·8	·23	·9
2 lb. cotton-seed meal	1·8	·67	1·3
	22·9	1·41	10·6

The ration is still rather low in digestible protein for a milking cow and a little high in starch equivalent. The bush hay is evidently too poor to form a suitable basis for the ration, and the amount of concentrated food should not be raised over one-third of the total ration. The ration would have been still very much poorer if a poor quality

bush hay had been used. The ration could be brought up to standard by increasing the cotton-seed meal to the maximum amount which can be safely given to a cow, making the ration as follows:—

	Dry Matter.	Digest. Protein.	Starch Equivalent.
17 lb. bush hay	15·6	·32	5·6
3 lb. maize meal	2·6	·14	2·1
2 lb. bran	1·8	·23	·9
3 lb. cotton-seed meal	2·7	1·01	2·1
	22·7	1·70	10·7

All the rations so far mentioned are deficient in not containing any succulent food, which is so essential to milking cows.

An excellent ration could be made up with **maize silage** as a basis, and using such concentrates in addition which are at present the cheapest foods on the market:

	Dry Matter.	Digest. Protein.	Starch Equivalent.
40 lb. maize silage	12·0	·24	5·6
8 lb. lucerne chaff	7·3	·82	2·4
3 lb. barley meal	2·6	·25	2·2
1 lb. cotton-seed meal	0·9	·34	0·7
	22·8	1·65	10·9

This ration is just a little high in starch equivalent, but otherwise correct.

Similar rations can be made up from any material on the farm, by using the table of analysis of foods.

Besides the method used above for the compounding of rations, and the method mentioned, where the fuel value of the foods can be utilised for such calculation, Henry and Morrison in "Feeds and Feeding" (Abridged) use a method in which the calculation is based on the amounts of digestible crude proteins and total digestible nutrients. A dairy cow of 1,000 lb. live weight requires—

	Digest. Crude Protein.	Total Digestible Nutrient.
	Lb.	Lb.
For maintenance only	0·70	7·92
And in addition for each pound of milk of—		
3·0 per cent. fat	0·047—0·057	0·257—0·286
3·5 per cent. fat	0·049—0·061	0·284—0·316
4·0 per cent. fat	0·054—0·065	0·311—0·346

Based on this method of calculation, E. H. Gurney published in the April number of the "Queensland Agricultural Journal" a complete list of rations, using the various more common foodstuffs available. To make the work more complete and useful these rations are herewith given. It must be, however, clearly understood that the quantities given can only be approximate, as the composition of the roughage can show a variation.

A 1,000-lb. cow yielding 25 lb. of milk with 3.5 per cent. fat requires any of the following rations per day:—

(1) 40 lb. green sorghum,
60 lb. mixed pasture,
8 lb. lucerne chaff.

(2) 65 lb. green sorghum,
7 lb. lucerne chaff,
7 lb. maize meal.

(3) 45 lb. green sorghum,
13 lb. wheat chaff,
3 lb. bran,
2¾ lb. cotton-seed meal (decort.),
2 lb. molasses.

(4) 50 lb. green sorghum,
40 lb. cowpea vines,
3 lb. bran,
1¾ lb. cotton-seed meal (decort.),
4 lb. molasses.

(5) 42 lb. sorghum silage,
9 lb. lucerne chaff,
7 lb. maize meal.

(6) 35 lb. sorghum silage,
5 lb. lucerne chaff,
6 lb. wheat chaff,
2 lb. linseed oil meal,
3 lb. pollard,
3 lb. rice meal.

(7) 65 lb. green maize,
8 lb. lucerne chaff,
7 lb. maize meal.

(8) 54 lb. green maize,
10 lb. wheat chaff,
3 lb. maize meal,
3 lb. bran,
2¾ lb. cotton-seed meal (decort.).

(9) 30 lb. maize silage,
5 lb. good bush hay,
4 lb. cowpea chaff,
5 lb. maize meal,
3 lb. coconut cake,
1 lb. blood meal.

(10) 35 lb. maize silage,
8 lb. lucerne chaff,
7 lb. barley meal.

(11) 80 lb. green paspalum,
6 lb. lucerne chaff.

(12) 67 lb. green paspalum,
3 lb. maize meal,
3 lb. bran,
2 lb. cotton-seed meal (decort.).

(13) 100 lb. Sudan grass,
4½ lb. lucerne chaff.

(14) 100 lb. Sudan grass,
3 lb. bran,
1 lb. cotton-seed meal (decort.).

(15) 50 lb. Sudan grass,
8 lb. wheat chaff,
4 lb. lucerne chaff,
3 lb. maize meal,
2 lb. linseed oil meal.

(16) 20 lb. green oats,
8 lb. lucerne chaff,
10 lb. wheat chaff,
3 lb. coconut cake,
3 lb. molasses.

(17) 25 lb. green barley,
13 lb. wheat chaff,
6 lb. lucerne chaff,
2 lb. linseed oil meal,
3 lb. molasses.

(18) 60 lb. sugar cane tops,
10 lb. cowpea chaff.

(19) 50 lb. sugar cane tops,
30 lb. green cowpea,
5 lb. lucerne chaff.

(21) 35 lb. elephant grass,
35 lb. imphee,
8 lb. lucerne chaff,
5 lb. maize meal.

(21) 35 lb. elephant grass,
35 lb. imphee,
10 lb. pumpkins,
7 lb. lucerne chaff,
5 lb. maize meal.

(22) 65 lb. mixed pasture,
9 lb. lucerne chaff,
5 lb. maize meal.

(23) 15 lb. bush hay (poor),
10 lb. pumpkins,
5 lb. lucerne chaff,
7 lb. maize meal,
1 lb. blood meal.

(24) 65 lb. prairie grass,
5 lb. wheat chaff,
5 lb. maize meal,
1 lb. molasses.

Feeding of Horses.

When making up food rations for horses we must remember that the digestive organs of a horse differ from those of ruminants. A horse cannot digest such large amounts of coarse bulky food rations as given to cows, and as a rule only one-third of the amount of roughage given to a cow should be supplied to a horse. Hand-fed milking cows should

receive approximately one-third of the total dry of the ration in form of grain or concentrated foodstuffs, whereas to working horses one-half of the dry matter of the ration can be profitably given in form of grain or concentrates.

Valuable work with regard to horse feeding was done some years back by Professor A. J. Perkins in South Australia, paying particular attention to the "feeding value" prices of various foodstuffs in normal and abnormal seasons. Professor Perkins also collected data about the rations fed in old-established livery stables and city carriers, and it was interesting to note how closely the rations found to be most suitable by long continued practical experiences of these firms, agree with Kellner's standards.

Light horses (averaging 1,000 lb. live weight) doing mail and other fast road work received a daily ration of 24 lb. wheat hay chaff, 2 lb. bran, and 2 lb. pollard, and twice weekly from 6 to 8lb. of green lucerne.

Draught horses (1,400 lb. live weight) doing road and slow delivery work received 32 lb. wheat hay chaff, 8 lb. bran, and twice weekly 8 to 10 lb. of lucerne; an additional allowance of 4 to 6 lb. of crushed oats was given when doing long and heavy trips.

Another firm of carriers fed to medium draught horses (1,200 lb. live weight) a ration of 32 lb. wheat hay chaff and 5 lb. of bran, with an additional 5 lb. of oats in the winter months. When chaff became too expensive, they used with good results a ration consisting of 25 lb. of wheat hay chaff and 10 lb. crushed maize.

Feeding of Pigs.

The general rules laid down for feeding of stock apply to pigs, and there are no farm animals (the milking cow excepted), which put their food to better use than pigs. The aim of the pig farmer should be to produce as much growth as possible in the shortest time, and for this reason the ration for the young growing pig should be more nitrogenous, with a narrow nutritive ratio of about $1 \div 4$. The amount of carbohydrates may be increased as the pigs grow older, and more so in the fattening period.

Lucerne is one of the best foods for pigs, and a field of lucerne is the only pasturage where pigs can be raised without any other food. As already pointed out, young growing pigs should, if possible, obtain some of the protein from an animal source, and for this reason skim milk is of particular value as part of a ration for pigs. Ground barley, where obtainable at reasonable cost, is another staple food for pigs.

A standard ration for ten young pigs of about 50 lb. average live weight would consist of 6 lb. pollard, 10 lb. ground barley, 4 lb. lucerne hay (chaffed) soaked in 4 gallons of skim milk. The 4 lb. of lucerne hay could be replaced by about 18 lb. of fresh cut green lucerne.

In cases where no lucerne is available more grain may be used, giving a ration consisting of 11 lb. pollard, 7 lb. crushed maize, 2 lb. linseed meal, with 4 gallons of skim milk.

As succulent foods sweet potatoes, swedes, sugar mangels, pumpkins may be used. Separated or skim milk can be replaced by buttermilk.

With the ruling high prices which have to be paid for pollard and all concentrates, the standard rations above mentioned could not possibly be profitable and would have to be modified by utilising to a

large extent succulent crops grown on the farm. From one-third to one-half of the ration must be made up from root crops, green crops like sorghums, rape, &c.

The importance of growing only such varieties of root crops which are particularly rich in nitrogenous matter is quite apparent, and the cultivation of sugar mangels already alluded to, containing three times the amount of nitrogen found in ordinary mangel, should be encouraged in all localities where it can be successfully grown.

The success of any pig farm will depend entirely on the quality and quantity of the food grown on the farm.

Feeding of Poultry.

Practical experience has taught the poultry farmer that laying hens require a ration fairly rich in nitrogenous nutrients, part of which should be of animal origin. A nutritive ratio from 1 ÷ 4½ to 1 ÷ 5 has proved successful.

Hens of a heavy type require comparatively less food than the more energetic lighter types.

According to Professor Wheeler, of the New York State Station, hens in full laying require:—

	Digestible Nutrients per Day per 100 Lb. Live Weight—			
	Total Dry Matter.	Protein.	Fat.	Carbo-hydrate.
	Lb.	Lb.	Lb.	Lb.
Hens from 5 to 8 lb. weight	3·30	0 65	0·20	2·25
Hens from 3 to 5 lb. weight	4·50	1·00	0·35	3·75

In accordance with these amounts the daily ration for 100 laying hens, of light weight, should consist of 16 to 18 lb. dry matter, 2.50 to 3.0 lb. protein, 0.5 to 1.0 lb. of fat, and 10.0 to 11.5 lb. of carbohydrates.

Hens can only digest a very small amount of crude fibre, and this fact must not be lost sight of when chossing the most suitable grain for feeding, and for this reason oats are not so suitable as wheat or barley.

Of importance is a plentiful supply of mineral matters, containing lime and phosphoric acid, and grit and charcoal to aid in digestion.

A few standard rations to supply a liberal amount of food required by 100 hens of an average weight of 4 to 5 lb. per day can be made up as follows:—

I.	II.	III.
9 lb. wheat	11 lb. wheat	1 lb. wheat
5 lb. pollard	3 lb. bran	3 lb. bran
5 lb. bran	4 lb. pollard	5 lb. crushed barley
15 lb. (1½ gall.) skim milk	2 lb. lucerne meal	5½ lb. copra cake
	1 lb. meat meal	5½ lb. lucerne meal.

An occasional change of the constituents of any ration is generally beneficial, but any change must be made very gradual, as with a sudden change of food fowls may refuse to eat it.

The amount of food required by growing chicks, per 100 lb. live weight, is much greater than the amount for fowls above mentioned. Pullets weighing about 1 lb. require just double the amount of food than given to hens of light weight.

At the present time dry mash feeding from suitable hoppers has become popular, and is very successful where a large number of fowls are kept. A good dry mash is made up as follows:—Four parts (by measure) of bran, one part each of pollard, ground oats, ground barley, corn meal, beef scraps, with ½ lb. of salt for one bag of the mixture.

Any other grain or seed, like Kaffir corn, sorghum seed, sunflower seed, panicum, canary seed, peas, beans, &c., may be substituted for other seeds, if obtainable at reasonable cost, always bearing in mind that the seeds, as feed for fowls, must be chiefly judged by their protein content, and not so much by number of food value.

In conclusion, I must point out that the figures given for the compounding of rations cannot be followed implicitly in all cases, but a certain latitude must frequently be allowed.

The objects of this pamphlet are chiefly the spreading of knowledge with regard to stock foods in general, to eliminate errors in feeding, and more particularly to draw attention to some of the foods hitherto neglected, which can take the place of other more expensive foods. In nearly all cases practical experience is a valuable guide, but whenever possible combine "Practice with Science."

TABLE I.

Composition of Stock Foods.

Green Fodders.	Crude Nutrients Per Cent.						Digestible Nutrients Per Cent.							Per 100 lb.		lb. of Fodder to Supply.	
	Moisture.	Protein.	Fat.	Carbohydrates.	Fibre.	Ash.	Crude Protein.	True Protein.	Fat.	Carbohydrates.	Fibre.	Nutritive Ratio 1 ÷	Value Number per cent.	Production Starch Equivalent.	Food Units.	1·65 lb. Protein.	9·0 lb. Starch Equivalent.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Grasses and Cereals—																	
Barley, in flower	79·0	2·7	0·6	8·0	7·9	1·8	1·8	1·5	0·4	6·0	4·3	7·3	80	9·9	15·5	110	91
Buffalo grass	78·0	2·1	0·5	12·3	4·6	2·5	1·4	1·2	0·3	8·8	2·9	10·3	80	10·7	15·8	138	84
Canary grass	76·5	2·8 (2–3)	0·6	12·1	5·8	2·2	1·8	1·5	0·4	8·6	3·2	10·9	80	14·2	20·8	110	64
Couch grass	74·1	4·1	0·4	10·0	8·4	3·0	3·0	2·0	0·2	7·0	4·9	6·2	85	12·1	19·8	83	74
Flinders grass ..	68·0	1·8 (1·2–2·5)	0·4	11·3	14·0	4·5	1·2	1·0	0·2	7·8	8·0	16·2	76	13·0	19·2	165	69
Foxtail millet (*Setaria italica*)	87·0	1·3 (1·0–2·0)	0·2	6·2	4·1	1·2	0·7	0·4	0·1	3·8	2·2	15·5	82	5·4	8·0	412	167
†Guinea grass (*Panicum maximum*)	80·0	2·6 (0·7–3·5)	0·5	9·4	12·0	3·5	1·6	1·0	0·3	7·6	7·0	15·2	80	12·9	19·2	165	70
Indian cane	77·0	1·5	0·2	11·0	8·9	1·4	1·0	0·7	0·1	7·9	5·2	19·0	80	11·2	15·8	236	80
Maize	82·0	1·7	0·5	9·0	5·6	1·2	1·0	0·6	0·3	6·0	3·1	16·2	83	8·7	12·2	286	104
Mitchell grass.. ..	74·0	1·4 (1–2·1)	0·4	9·3	11·3	3·6	0·9	0·5	0·2	7·5	6·2	28·2	76	11·1	16·4	330	81
Mixed pasture, poor ..	80·0	0·7	0·2	7·5	9·0	2·6	0·5	0·3	0·1	5·4	5·2	35·4	86	9·4	11·9	550	95
Mixed pasture, average	80·0	1·3	0·3	7·8	8·2	2·4	0·9	0·5	0·2	5·8	5·0	22·4	90	10·5	13·5	330	86
Mixed pasture, best ..	80·0	2·5	0·8	8·5	6·0	2·2	1·6	1·3	0·4	6·3	3·6	8·2	92	10·8	14·6	127	83
Oats, in flower ..	76·8	1·9	0·6	10·4	8·5	1·8	1·4	1·2	0·4	6·5	4·9	10·1	75	9·9	15·6	138	91
Panicum frumentosum	76·0	1·5	0·5	12·0	6·0	4·0	1·0	0·6	0·3	8·5	3·6	21·2	80	10·7	15·2	286	84

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Paspalum	75·0	2·3 (1·2–4)	0·4	8·9	10·4	3·0	1·5	1·2	0·2	7·0	6·2	11·7	80	11·8	17·1	138	76
Prairie grass	76·8	4·6 (2·7–6·4)	0·8	8·5	6·7	2·6	3·0	2·2	0·4	6·6	4·3	5·3	86	11·7	19·1	75	77
Rhodes grass	75·0	1·8 (1·5–3)	0·4	10·0	10·3	2·5	1·3	1·0	0·2	6·8	6·0	13·2	80	11·3	16·5	165	80
†Sorghum (saccharine)	80·0	2·1 (1·7–2·7)	0·6	9·7	6·2	1·4	1·2	0·7	0·2	5·8	3·3	13·6	79	8·1	12·5	236	111
Summer grass ..	72·0	1·4	0·3	13·1	10·0	3·2	0·9	0·5	0·1	9·3	6·0	31·0	85	13·6	17·8	330	66
†Sudan grass	78·0	2·3	0·2	11·0	6·2	2·3	1·5	1·1	0·1	7·5	3·8	10·5	82	10·2	5·3	150	88
Sugar-cane tops ..	72·0	2·6	0·7	12·9	10·0	1·8	1·7	1·2	0·3	9·4	6·5	13·7	80	14·1	20·8	136	64
Water couch (*Paspalum distichum*)	77·0	1·8 (1·4–2·3)	0·3	10·7	7·5	2·7	1·4	1·1	0·1	7·1	5·0	11·2	82	10·9	15·8	150	83
Legumes—																	
Cowpea vines ..	78·0	2·3 (1·7–3·6)	0·6	10·7	5·5	2·9	1·6	1·2	0·3	7·3	2·8	8·9	77	9·1	14·7	136	99
Field pea, in flower ..	83·2	3·5	0·6	5·6	5·9	1·2	2·4	1·6	0·3	3·7	3·0	4·6	77	6·8	13·3	103	132
Lucerne, young ..	81·1	5·6	0·8	6·2	1·4	1·9	4·3	2·7	0·4	4·7	2·0	2·8	87	8·8	9·3	61	102
Lucerne, in flower ..	76·0	4·5	0·8	9·6	6·8	2·3	3·2	1·7	0·4	6·3	2·9	5·9	79	9·2	18·0	97	98
Trefoil (Medic burr)	78·6	4·3	0·5	10·8	3·0	2·8	3·0	1·5	0·2	7·4	1·6	6·3	80	8·8	16·9	110	102
Wild lucerne (*Stylosanthes mucronata*)	76·0	4·3	0·3	9·7	7·7	2·0	3·0	1·5	0·1	6·4	3·8	6·9	80	9·4	17·9	110	96
2. Roots, Tubers, &c.—																	
Canna edulis (Queensland arrowroot)	76·8	0·3	0·1	20·5	0·7	1·6	0·2	0·1	..	18·5	..	184	100	18·6	18·9	1,650	48
Carrot	83·0	1·0 (0·6–1·2)	0·2	11·9	1·6	2·3	0·7	0·3	0·1	11·0	0·9	41	87	10·6	14·0	550	85
Kohl rabi	84·6	1·2 (0·8–2·0)	0·1	9·7	3·0	1·4	0·5	0·2	..	8·8	1·5	51	90	9·4	11·6	825	96
Mangolds	85·0	1·2 (0·5–1·7)	0·1	10·0	2·3	1·4	0·7	0·1	..	9·0	1·1	161	70	7·1	11·9	1,650	127
Melon, pie	94·0	0·7	0·2	3·3	1·4	0·4	0·5	0·2	0·2	3·9	0·8	25	90	4·8	6·7	825	188
Potato, English ..	75·5	2·1	0·1	20·4	0·9	1·0	1·1	0·2	..	18·4	..	92	100	18·6	21·1	825	48
Potato, sweet ..	70·8	1·9 (0·5–2·8)	0·2	25·3	0·8	1·0	1·0	0·2	..	23·0	..	115	100	23·2	25·5	825	39
Pumpkins	83·0	2·2	0·9	9·0	3·1	1·6	1·5	1·0	0·6	8·0	1·6	11	85	9·7	17·7	165	93

TABLE I—*continued.*

Composition of Stock Foods—*continued.*

—	Crude Nutrients Per Cent.						Digestible Nutrients Per Cent.							Per 100 Lb.		Lb. of Fodder to Supply.	
	Moisture.	Protein.	Fat.	Carbohydrates.	Fibre.	Ash.	Crude Protein.	True Protein.	Fat.	Carbohydrates.	Fibre.	Nutritive Ratio 1 ÷	Value Number per cent.	Production Starch Equivalent.	Food Units.	1·65 lb. Protein.	9·0 lb. Starch Equivalent.
Green Fodders.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
2. Roots, Tubers, &c.—*continued.*																	
Sugar Beet	77·0	1·3	0·1	17·8	1·8	2·0	1·0	0·3	..	17·5	0·7	61	75	13·9	20·7	550	75
Swede, purple top ..	86·0	1·0 (0·8–1·3)	0·1	10·1	1·6	1·2	0·6	0·2	..	9·7	0·8	52	85	8·9	12·0	825	101
Turnip, Scotch, yellow top	89·5	1·0 (0·6–1·2)	0·1	6·7	1·6	1·1	0·6	0·2	..	6·4	0·6	35	77	5·5	8·5	825	164
3. Various—																	
Cabbage	89·0	1·5	0·4	5·9	2·0	1·2	1·1	0·7	0·2	4·6	1·4	9·2	94	6·7	9·1	236	134
Mustard	85·1	3·9 (2·5–4·5)	0·5	5·1	3·0	2·4	2·5	1·8	0·3	3·5	1·6	3·2	90	6·7	11·9	92	134
Prickly pear	86·5	0·4	0·1	8·8	1·8	2·4	0·2	0·2	..	4·0	0·5	23·0	85	3·6	5·0	825	250
Rape	86·0	3·5	0·7	4·2	3·5	2·1	2·6	1·9	0·4	2·9	1·9	2·9	87	6·4	12·1	87	140
Saltbush	67·8	5·0 (4–6)	0·7	14·8	6·6	5·1	2·6	1·5	0·3	9·8	2·6	8·7	60	8·6	19·5	110	105
Sheeps Burnett ..	76·3	4·4 (3·3–5·5)	0·7	9·0	6·2	3·4	2·4	1·3	0·3	6·0	2·5	7·0	70	7·2	15·1	127	125
†Sweet potato vines ..	85·6	2·0	0·7	6·3	2·8	2·6	1·0	0·6	0·2	5·2	1·8	12·3	80	6·4	9·9	286	141
Turnip, Swede leaves ..	88·4	2·2	0·5	5·3	1·5	2·1	1·5	0·4	0·2	4·2	0·8	13·5	93	5·4	9·1	413	167

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
4. Silage—																	
Maize	70·0	1·9 (1·5–2·6)	0·7	15·5	9·2	2·7	1·0	0·6	0·3	10·7	5·2	27·5	82	11·0	19·0	286	61
Sorghum	74·3	1·8	0·4	10·4	8·9	2·2	·9	0·5	0·2	7·3	4·9	28·6	78	11·5	16·6	330	78
Sugar-cane tops ..	78·0	1·3	0·6	9·4	8·0	2·7	·6	0·3	0·2	6·6	4·0	55	80	15·1	18·0	550	60
Wheat, thistles, and mustard	65·9	4·6	1·2	13·5	11·9	3·8	2·2	1·2	0·6	9·5	6·5	9·8	80	10·4	17·3	136	87
Dry Fodders.																	
5. Hay and Chaff—																	
Barley	9·5	10·4	2·2	37·2	31·8	8·9	4·8	3·4	0·8	23·2	18·0	12·6	66	30·5	54·9	49	24
Bush hay, good ..	7·5	6·1	1·9	38·6	39·8	6·1	2·8	1·9	0·6	24·0	22·6	25·2	66	32·8	54·9	87	27
Bush hay, poor ..	6·5	2·8	1·1	36·6	45·3	7·3	1·4	0·7	0·5	18·5	20·2	56·8	50	20·3	43·3	236	54
Cowpea, chaff ..	8·1	15·7	4·3	31·5	26·6	13·8	11·2	6·8	1·9	19·0	13·5	5·3	67	28·6	64·2	24	31
Lucerne, before flowering	8·2	21·0	2·8	31·4	25·9	10·7	15·7	10·5	1·3	21·2	11·8	3·4	63	28·7	75·6	16	31
Lucerne, in full flower	10·9	15·0	2·8	33·2	31·0	8·0	10·3	6·6	1·3	20·3	13·9	5·6	57	24·6	62·7	25	37
Lucerne chaff, poor ..	10·0	16·6	0·9	39·3	25·2	8·0	11·3	7·3	0·4	21·4	11·3	5·0	57	21·8	64·8	23	36
Lucerne chaff, good ..	8·0	20·7	1·4	40·9	20·0	9·0	15·5	10·3	0·7	27·7	8·4	3·6	63	29·8	76·4	16	30
Wheat	10·0	9·4 (6–10)	0·8	47·4	27·6	7·8	5·2	3·6	0·4	27·6	14·6	9·2	67	24·4	46·0	46	37
Wheat chaff	12·0	4·7 (4–6·5)	1·7	12·0	30·4	9·2	2·1	1·5	0·9	26·1	16·1	28·1	67	29·2	47·4	110	31
6. Straw																	
Barley	8·5	3·5	2·0	38·4	41·0	6·6	1·0	0·7	0·8	20·2	22·0	62·5	46	20·5	46·2	236	44
Oats	9·2	4·0	2·3	42·4	37·0	5·1	1·5	1·2	0·7	19·4	21·0	34·8	43	18·4	45·5	136	49
Wheat	8·3	2·9	1·2	42·6	39·0	6·0	0·2	0·1	0·4	15·6	19·5	36·0	32	11·5	36·4	1,650	78
7. Grains, &c.—																	
Barley	14·0	8·6	1·5	71·0	2·7	2·2	6·5	5·9	1·2	65·0	1·6	11·7	98	73·2	85·4	28	12
Beans	14·3	25·4	1·5	48·5	7·1	3·2	20·1	19·3	1·2	44·1	4·1	2·6	97	66·7	101·1	9	14
Canary seed	11·5	15·2	5·4	57·7	5·1	5·1	11·5	10·6	4·3	48·7	2·9	5·6	97	69·6	88·4	16	13
Cowpeas	14·8	20·8	1·4	55·7	4·1	3·2	16·5	15·8	1·1	50·5	2·4	3·5	97	68·0	96·5	10	13
Kaffir corn	9·3	9·9	1·4	74·9	1·5	3·0	7·3	6·8	0·9	56·2	0·8	8·7	95	62·0	77·2	24	15
Linseed	7·9	18·2	38·6	20·0	12·1	3·2	14·6	13·6	32·8	16·0	1·0	7·0	98	107·5	132·3	12	8
Maize	13·0	9·5 (8–13)	4·0	69·3	2·8	1·4	6·7	6·2	3·5	65·8	1·8	12·1	100	80·8	91·8	28	11
Millet (foxtail) ..	12·8	10·9	2·9	55·2	14·3	3·9	8·3	7·7	2·1	41·5	1·3	6·1	95	51·6	68·0	22	17
Millet, Japanese ..	11·5	12·6	4·8	60·8	8·6	3·7	10·2	9·1	3·7	45·7	1·2	6·0	95	60·1	80·2	18	15

TABLE I.—*continued.*

Composition of Stock Foods—*continued.*

	Crude Nutrients Per Cent.					Digestible Nutrients Per Cent.						Nutritive Ratio 1 :	Value Number per cent.	Per 100 Lb.		Lb. of Fodder to Supply	
	Moisture.	Protein.	Fat.	Carbohydrates.	Fibre.	Ash.	Crude Protein.	True Protein.	Fat.	Carbohydrates.	Fibre.			Production Starch Equivalent.	Food Units.	165 lb. Protein.	970 lb. Starch Equivalent.
Dry Fodders *continued.*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
7. Grains, &c. *continued.*																	
Oats	13·3	10·3	4·8	58·2	10·3	3·1	8·0	7·2	4·0	44·8	2·6	7·8	95	59·5	75·8	23	15
Sorghum	12·8	8·9	3·6	70·8	2·0	1·9	4·6	4·1	2·8	60·6	1·2	16·5	98	70·0	79·2	40	13
Sunflower	8·6	16·3	21·2	21·4	29·9	2·6	14·7	12·8	20·2	15·4	11·0	5·9	92	80·0	111·7	13	11
Wheat, plump ..	13·4	12·8 (7·5–16·6)	2·0	67·7	2·4	1·7	10·8	9·5	1·3	62·2	1·1	6·9	95	71·1	93·0	17	13
Wheat, shrivelled ..	11·1	16·5	3·0	63·6	3·5	2·3	13·9	12·3	1·9	58·5	1·7	5·2	95	71·9	98·8	13	13
8. Oilcakes and Meals and By-products—																	
Barley branning ..	10·5	14·0 (11–15)	3·8	57·3	10·1	4·3	11·9	10·8	3·2	45·0	3·1	5·1	96	62·3	84·6	15	14
Barley meal	11·7	12·4 (10–13·5)	1·0	67·1	5·3	2·5	9·4	8·5	0·8	61·0	3·0	7·7	98	72·2	89·2	19	12
Bran	10·6	15·8 (13 18)	2·6	56·3	9·8	4·9	12·3	11·6	1·8	40·5	3·3	4·1	77	45·0	78·0	14	20
Brewers' grain, wet ..	73·0	7·5	2·0	10·1	6·0	1·4	5·5	5·2	1·6	6·2	2·4	2·3	86	14·6	25·8	32	62
Coconut cake ..	12·8	17·2	7·5	46·7	10·5	5·3	13·5	13·0	7·2	39·8	6·6	4·9	100	75·9	102·5	13	12
Corncobs, ground ..	8·4	2·5	0·7	54·7	32·0	1·7	0·5	0·3	0·6	26·3	18·3	153	50	23·1	47·1	550	39
Cotton-seedmeal, decort.	9·0	41·0	7·0	29·0	8·0	6·0	35·3	33·7	6·6	19·5	2·2	1·1	97	67·2	125·9	5	13
Cotton seed	9·4	19·5	19·0	24·9	22·6	4·6	13·3	12·5	16·5	12·8	16·8	5·5	90	40·7	100·4	14	22

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Cotton-seed, meal undecort.	9·0	24·0	5·0	35·0	22·0	5·0	17·1	16·2	4·5	18·0	4·0	2·0	84	40·3	75·6	10	22
†Linseed meal (crushed linseed)	7·9	18·2	38·6	20·0	12·1	3·2	14·6	13·6	36·6	16·0	4·0	7·9	99	119·5	144·5	12	7½
†Linseed oil meal ..	9·8	25·5 (25–27)	8·0	39·2	11·0	6·5	22·0	20·9	7·4	31·4	4·5	2·6	96	70·4	108·7	8	13
Linseed meal (new process)	11·2	27·2	0·8	40·7	13·9	6·2	23·4	22·8	0·7	32·6	7·0	1·8	96	60·3	99·8	7	15
Maize meal	13·0	8·6 (8–12)	3·7	71·4	2·0	1·3	5·1	4·6	3·0	60·0	1·1	14·7	98	70·3	80·3	36	13
Malt sprouts (dried) ..	10·0	24·4	2·0	42·4	14·0	7·2	19·9	12·0	1·5	30·9	12·7	3·9	75	43·7	96·6	14	21
Millet meal	12·0	10·7	4·0	61·1	8·3	3·9	8·0	7·4	3·1	45·8	2·9	7·5	95	59·1	75·2	22	15
Peanut meal	10·7	47·6	8·0	23·7	5·1	4·9	42·8	41·4	7·2	20·2	0·4	0·9	98	75·2	144·9	4	12
Peanut cake undecort.	10·3	30·2	9·1	21·8	22·9	5·7	27·7	26·8	8·2	18·4	2·6	1·5	86	56·7	110·0	6	16
Pollard	10·4	15·7 (13·5–20)	3·6	61·4	5·8	3·1	13·8	11·9	3·1	54·0	2·1	5·3	86	63·6	97·1	14	14
Rice meal	10·1	11·5	11·3	55·0	4·6	7·5	6·7	5·9	9·5	50·1	2·3	12·2	96	74·8	89·2	28	12
9. VARIOUS FOODS—																	
Calf meal	10·6	16·2 (12–22)	7·2 (5–11)	55·9	4·5 (3–9)	4·6	13·1	10·0	4·5	45·0	4·0	5·9	86	58·3	91·3	17	15
Kubettes for sheep ..	10·0	13·8	3·1	59·5	8·3	5·3	11·0	7·5	2·8	42·0	4·5	7·0	86	51·1	79·9	22	18
Meatworks products—																	
Blood meal ..	10·0	75·1 (71–78)	1·5	7·7	..	5·7	67·0	58·5	1·3	5·0	..	0·01	100	63·1	175·6	3	14
Meat meals ..	8·0	54·4 (46–66)	8·0 (2–14)	6·1	..	23·5	48·3	42·0	7·0	4·5	..	0·5	100	60·8	143·3	4	15
Milk, cow's, whole ..	87·2	3·6	3·7	4·8	..	0·7	3·4	3·4	3·7	4·8	..	4·0	100	16·9	22·2	49	53
Milk, butter-milk ..	90·8	3·6	0·8	4·1	..	0·7	3·4	3·4	0·8	4·1	..	1·8	100	9·2	14·5	49	98
Milk, butter, dried ..	7·0	34·5	1·1	49·1	..	8·3	32·5	32·5	1·1	49·1	..	1·6	100	82·3	132·9	5	11
Milk, separated ..	90·4	3·8	0·1	4·9	..	0·8	3·6	3·6	0·1	4·9	..	1·4	100	8·6	14·2	46	105
Milk, skim milk powder	6·0	32·7	1·6	52·0	..	7·7	31·0	31·0	1·6	52·0	..	1·8	100	85·0	133·3	5	10
Milk, whey	93·4	0·7	0·2	5·0	..	0·7	0·6	0·6	0·2	5·0	..	9·1	100	6·1	7·0	286	150
Molasses	24·0	2·2	..	63·8	..	10·0	1·0	..	..	57·3	..	..	88	50·3	59·8	8	18
Treacle cubes ..	9·9	27·1	4·0	38·7	15·3	5·0	23·0	21·8	3·6	25·4	4·0	1·7	85	49·8	95·6	8	18
Linseed nuts	10·2	27·7	6·2	37·9	11·5	6·5	23·8	22·6	5·7	30·1	5·5	2·2	95	66·8	108·8	7	13

REMARKS: Foods marked † contain Hydrocyanic acid.

CHART OF DIGESTIBLE NUTRIENTS IN STOCK FOODS

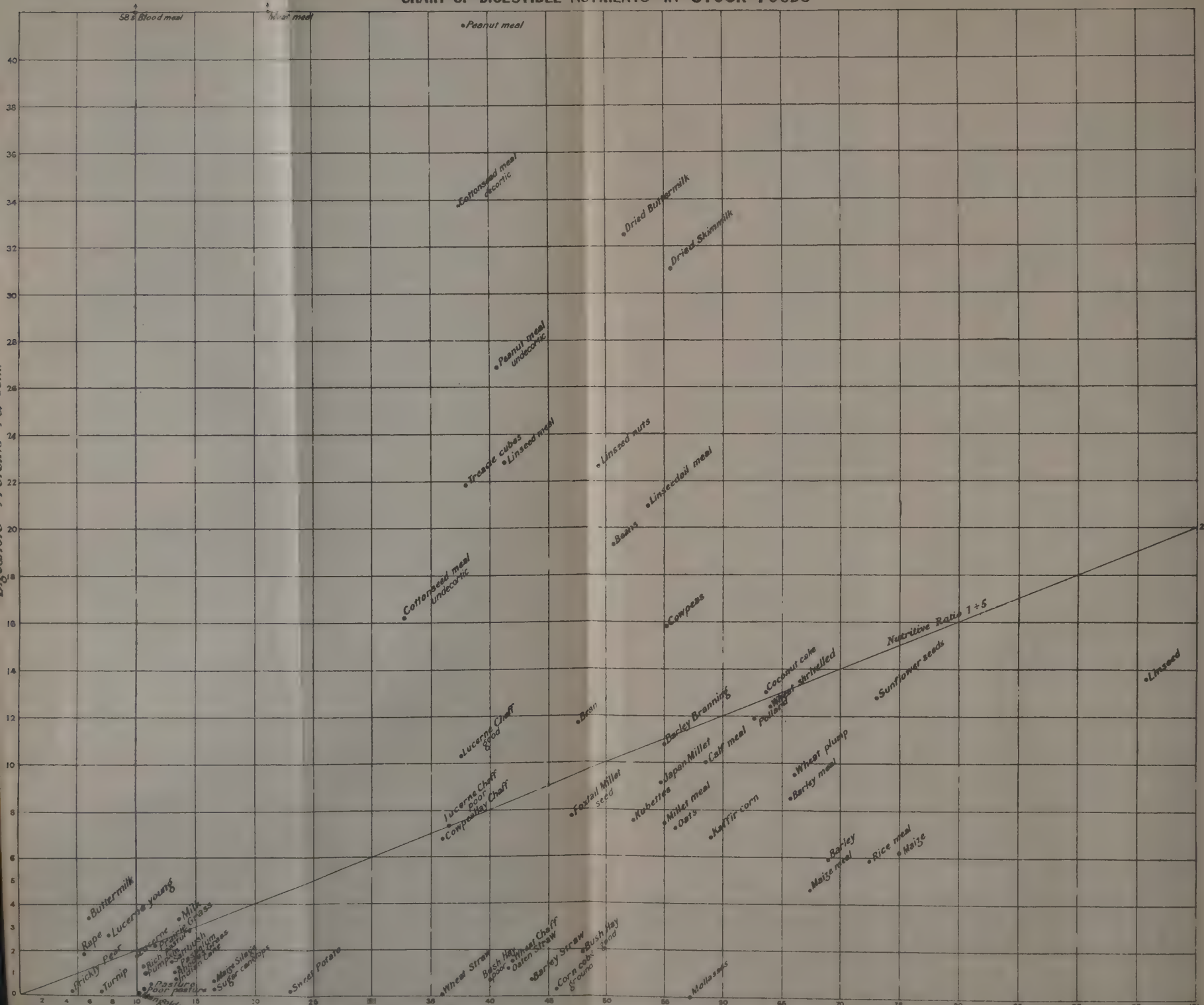


TABLE II.

Percentage of Nutrients Digested in Stock Foods.

—	Crude Protein.	Crude Fat.	Carbo-hydrates.	Crude Fibre.
By Ruminants—				
Pasture grass	56	46	61	62
Bush hay	35-61	49	49-65	46-64
Lucerne, green	77-83	37-54	65-77	32-47
Lucerne chaff	66-73	30-51	61-71	34-65
Green maize	56-78	40-83	66-78	59-75
Green sorghum	62	85	78	60
Wheat straw	0-26	17-44	29-40	42-59
Bran	80	51-60	40-88	37
Maize	58-84	81-99	84-100	46-100
Potatoes	23-88	..	82-99	..
Mangolds	44-89	..	91-100	0-43
Linseed cake	80-90	86-97	60-96	0-92
Cotton-seed meal, decorticated	84-96	93-100	44-71	0-100
Coconut cake	75-84	96-100	80-86	54-73
By Horses—				
Bush hay	43-62	6-33	45-61	34-39
Lucerne hay	70-77	6-30	67-71	35-44
Wheat straw	12-44	..	4-56	3-14
Potatoes	88	..	99	9
Carrots	99	..	94	..
Oats	68-94	50-88	70-84	1-56
Maize	75-78	59-63	90-94	40-100
Linseed cake	57-88	53	94-98	..
By Pigs—				
Potatoes	57-88	..	97-99	28-88
Maize Meal	84	74	94	41
Wheat	80	70	83	60
Bran	75	70	65	30
Mangolds	55	..	98	79
Linseed cake meal	86	80	85	12
Coconut cake	73	83	89	60
Meat meal	97	86	..	..
Sour milk	96	95	98	..

TABLE III.

Standard Rations.

Per Day and per 1,000 lb. Live Weight of each Animal.	Dry Material in Total Ration.	Digestible Nutrients.	
		Pure Protein.	Starch Equivalent.
	Lb.	Lb.	Lb.
Horses—			
At light work	18 to 23	1·0	9·2
Medium work	21 to 26	1·4	11·6
Heavy work	23 to 28	2·0	15·0
Milch Cattle—			
For maintenance at rest	20	0·7	6·0
Yielding 10 lb. milk	22 to 27	1·0 to 1·3	7·8 to 8 3
Yielding 20 lb. milk	25 to 29	1·6 to 1·9	9·2 to 11 2
Yielding 30 lb. milk	27 to 33	2·2 to 2·5	11·8 to 13 9
Yielding 40 lb. milk	27 to 34	2·8 to 3·2	13·9 to 16·6
Fattening cattle	24 to 32	1·5 to 1·7	12·5 to 14 5
Growing Cattle—			
2-3 months, 150 lb. weight	23	3·4	18·5
3-6 months, 300 lb. weight	24	2·8	14·7
6-12 months, 500 lb. weight	26	2·3	12·5
12-18 months, 700 lb. weight	26	1·8	10·5
Sheep maintenance diet	18 to 23	1·2	8·7
Sheep fattening diet	24 to 32	1·9	14·5
Lambs, Wool Breeds—			
5-6 months, 60 lb.	27	3·0	16·4
6-8 months, 75 lb.	25	2·5	13·0
8-11 months, 80 lb.	23	1·8	10·7
11-15 months, 90 lb.	22	1·5	10·2
15-20 months, 100 lb.	22	1·2	9·7
Growing Pigs, Fattening Diet—			
2-3 months, 44 lb.	44	6·2	33·8
3-5 months, 110 lb.	36	4·5	32·0
5-6 months, 145 lb.	32	3·5	26·5
6-9 months, 200 lb.	28	3·0	24·5
9-12 months, 285 lb.	25	2·4	19·8

Table I. gives the actual composition of stock foods as obtainable and used. In recent publications the composition of foods, chiefly grasses, is generally given as calculated as percentage of water-free dry material, which allows a quicker comparison of the various materials. It must be understood that the composition must then be reduced by the amount of water present in the material, and, for instance, a young grass, reported to contain say 20 per cent. of protein in the dry matter, would only contain 5 per cent. of protein in the green stage with 75 per cent. of moisture, and 18 per cent. as hay with only 10 per cent. of moisture.

THE SEPTIC TANK.

Although civilisation, as we know it to-day, has conferred many benefits on mankind, it has also supplied us with quite a few problems and difficulties. One of the ever present problems is the proper and efficient disposal and destruction of human waste products. Particularly is this difficulty apparent in climates such as ours, where any carelessness and uncleanliness is liable to cause serious inconvenience and discomfort, and in many cases under certain conditions will cause the spreading of disease.

We know now that the common house-fly, generally supposed to be so harmless, is not only the filthiest of insects, but is also the most industrious germ-carrier ever found by science. We know that the fly breeds in any kind of filth, and it appears to have a particular preference for moist or wet nightsoil. Unfortunately, a plentiful supply of this is generally stored up by every household at a very convenient distance so that the fly may have full benefit of what we fondly believe to be for our special convenience.

The most general disposal of human wastes is by means of the "pan system." This system, if carefully carried out according to the Health Department's regulations, is reasonably safe, but breaches of these regulations are much too frequent by the people for whose protection they have been made, and nothing but an absolutely fool-proof method of disposal of these wastes can ever hope to be wholly satisfactory.

It has been found that the most satisfactory method of dealing with these wastes is by means of water. The water is made to act first as a collector, then as a carrier, and finally as a medium for final treatment and disposal.

The sewerage schemes of larger cities are sometimes difficult undertakings, often very expensive, but, because of the concentration of population, essential. But every home where a water supply is available, and where there is a sufficient supply to spare—say 3 to 5 gallons per head per day—can be provided with an inexpensive and efficient means for the disposal of these wastes.

The so-called septic or bacteriolytic tank is a self-contained sewerage system which, with but a modicum of care, will provide a home with a safeguard of health worth many times its price in convenience and comfort.

It requires no attention or cleaning out, and the only rule to observe is to see that no disinfectants are admitted to the tank. It saves the cost of a separate building, and, while the pedestal can be placed in a bathroom, the tank itself can be sunk in the ground under the house or be placed at any convenient point near it.

The Action of the Tank.

When the sewerage is discharged into the tank a separation immediately takes place, and floating matter rises to the top and particles in suspension gradually settle to the bottom.

Bacteriological action rapidly causes disintegration of the solids, which gradually become liquified. Evolution of gas takes place, and after some three to four weeks the top of the water in the tank becomes coated with a brown scum. The formation of this scum indicates a proper working condition of the tank, and it also forms an effective seal from the open air, and it is important that this scum be not broken.

If the depth of the tank is sufficient it will be found that there is a clear layer of water in the middle, and it is from this clear layer that the excess is drawn off.

As additional sewerage is added to the tank the clear liquid is expelled, and this liquid is then disposed of by means of a seepage trench so constructed that both the evaporation and seepage are encouraged.

This effluent may be taken for some distance and used for irrigating trees or shrubs. It is not advisable to permit bath or kitchen water to enter the tank.

Septic tanks have been in use in Australia since about 1870. Many tanks have been in constant use for twenty years or more, and in view of the satisfactory experiences of users and the high degree of efficiency to which the designs of tanks now on the market have been brought there is no excuse save, perhaps, lack of the necessary water supply for the absence of proper and up-to-date methods of sanitation in most of the country homes in Australia. That any hotel providing accommodation for guests should be without proper convenience, so easily installed, is nothing short of a disgrace.

SHELTER FOR STOCK—ANOTHER ARGUMENT FOR TREES ON THE FARM.

Trees provide a very necessary shelter for stock of all descriptions. To see a mob of cows or sheep huddled beneath a tree during the bitter winds of winter is to realise that the health and well-being of stock demand the provision of some efficient shelter. Too much food material is wasted in "warming the wind," or in meeting the increased demands of an exposed body. Sheltered animals require less food. Stockowners agree that mortality among sheep, particularly during lambing and shearing seasons, would be considerably lessened if good shelter were available. Animals clearly demonstrate their need for shelter, and if the stockowner were to provide it he would add appreciably to his profit.

Unlike breaks for crops or orchards, considerable latitude usually exists in the choice of a site for a stock shelter belt, as it may be situated practically anywhere within the paddock. Planting along the fence lines is often the method adopted, as the existing fence already provides protection on one side from damage by stock, necessitating the erection of only one new fence. In large paddocks, however, the shelter belt is best situated somewhere out in the centre of the paddocks, as stock have access to all sides of the belt, and can thus secure protection from all winds. On large areas such belts can be planted along ridges or on the top of small hills, and sites can be chosen which are not producing the best pasture grasses, but which are suitable for tree growth.

The shelter belt may be straight, crescent-shaped, or two belts may be arranged in the form of a cross. The last-mentioned shape is particularly effective, as it gives shelter over a fairly large area and from every quarter.

A bulletin "Tree Planting on the Farm," published recently by the New South Wales Department of Agriculture, from which the foregoing paragraphs are taken, contains a quantity of practical information on the various aspects of this subject.

BREEDING AND SELECTION OF DAIRY STOCK.

By C. F. McGRATH, Supervisor of Dairying.

THE industry needs better cows, and the dairy farmers and breeders must breed and rear the better cows, because they do not now exist to the extent required.

The foundation of the dairying industry for the future must be laid now in the breeding and rearing of high-class dairy stock.

That this work can be done with the degree of success its importance demands is evidenced by the success attained by many breeders of high-class dairy stock in this and other States of the Commonwealth.

Breeds of dairy cattle have been in existence for many years past, but the stud master of to-day breeds on dairy lines by selecting and mating animals whose parentage have high production records.

Pedigrees alone do not indicate the quality of milk and butter fat that a cow will produce. Such characteristics are the animal's heritage, and by careful dairying Nature's gift to her can be developed to its full capacity.

A successful stud master knows that a certificate of registry in a herd book is not evidence of high dairy production, and he realises that selection is not confined to pedigree. Attention is given to the constitution, production, conformation, and general characteristics of the animals selected from which to breed.

It is important that the constitution be sound, and this is indicated by large, well-developed lungs and a broad and deep chest. A sound state of digestive organs is important and has a great influence on all the functions of the body, and more especially on the secretion of milk.

Dairy type and conformation are readily discernible by the trained eye of the stock breeder. An animal of the desired type and character attracts and fills his eye and is then subjected to a close examination for the points and characteristics essential in good dairy animals.

A knowledge of the development of dairy qualities in cattle is a valuable aid in the selection and breeding of dairy stock.

The development of dairy qualities in the female begins by exciting the udder to unnatural activity by stripping it at frequent and regular intervals of all the milk secreted.

Care in handling and proper feeding are essential to produce high-quality dairy animals, and if supplemented with a sound knowledge of selection and breeding the desired characteristics will be transmitted to the offspring.

Such prepotency is to be obtained by line dairy breeding rather than by simply breed breeding.

Breeding.

A great deal has been written on breeding, and many breeders have contributed to the literature on the subject and quote pedigrees, and discuss high-class animals that have been inbred. Such results invariably reflect the intelligence of an experienced stud master.

Disastrous results have invariably followed inbreeding of dairy stock when practised by the inexperienced stock breeder, as is evidenced by the numbers of nondescript animals to be seen in many districts.

There are several methods of breeding, as practised by stud masters—viz., inbreeding, line breeding within distinct families, line breeding with distant strains of the same blood, and outcrossing, which is the continued introduction of fresh blood.

Inbreeding is the practice of mating closely related animals such as sire to daughter, son to dam, brother to sister.

It is considered that an animal is inbred when its parents have 50 per cent. or more of common ancestry in the pedigree.

The purpose of inbreeding is to fix or intensify desirable characteristics or qualities in animals so that they will more consistently transmit such characters to their offspring.

Many high-class flocks of sheep, herds of cattle, and breeds of horses have been established by inbreeding.

Such successes have been achieved by stock breeders who possessed an intimate knowledge of the breeding and general characteristics of the animals mated, a natural aptitude for their work, and the gift of observing the good and bad points of the selected animals.

The problem confronting the stud breeders is to choose animals that possess outstanding desired characters and to eliminate from the breeding operations those animals which possess undesirable characters. Skilful selection of the animals to be mated is the all-important factor in purifying the hereditary make-up of the individual in a herd, and for intensifying type and breed characteristics that will ensure that the offspring will inherit the character of the parents, to a degree equal to or better than their parents.

Line Breeding.

Line breeding may be differentiated from inbreeding as defining it as the mating of two animals identical to the extent of 25 per cent. and less than 50 per cent. of their blood. Line breeding is a popular practice with breeders, as it is not accompanied with so great a risk of reproducing and fixing undesirable characters as is associated with inbreeding.

Line breeding within proved strains of blood is a safe method for breeders desirous of improving their herds. The system widens the opportunities of selecting animals with desired characteristics.

Out Crossing.

Outcrossing is the mixing of strains of blood within one breed by mating animals entirely unrelated or having less than 25 per cent. of common ancestry entailing a continuous change of blood.

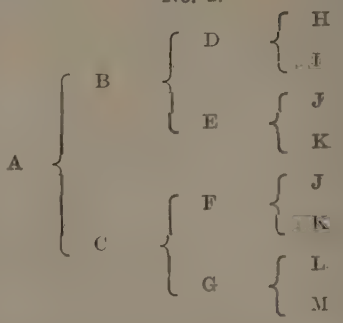
This method of breeding is frequently disappointing unless controlled by an experienced breeder. Ability to select sires with the characteristics necessary to maintain or improve the standard of the herd to which he is mated is essential, otherwise the more fresh blood that is introduced the more uneven in character will the herd become, though a few high-class animals may be bred.

A study of Mendel's laws of heredity will enable the breeder to readily understand why the outcrossing method is often unsuccessful and misleading to the young and inexperienced breeder of live stock. The pedigrees tabulated herewith clearly indicate the difference in the methods of breeding.

INBREEDING.

No. 1.

No. 2.

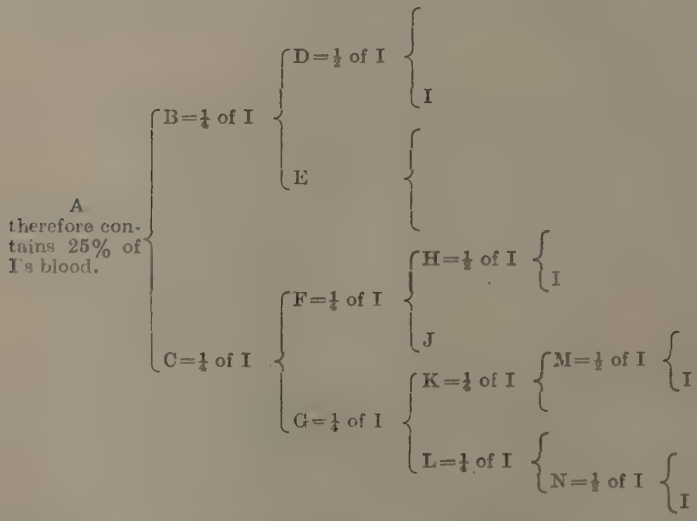


No. 1 tabulation indicates that A is inbred as son and daughter of sire D are mated.

No. 2 tabulated example indicates that E the dam of B (sire) and F the sire of C are full brother and sister, so that B and C the sire and dam of A are first cousins, in blood.

LINE BREEDING.

No. 3.



No. 3 tabulation indicates that A has been line bred to dam I. The dam G having two lines of blood to I has been mated with F, whose sire H is a son of I, and the progeny C has been bred to the sire B who is a grandson of I.

In this case line breeding with distant strains of the blood of dam I has been carried out, and there has been sufficient latitude to allow faults to be eliminated and desired characteristics to be fixed by selection.

By this method desired individual characteristics of animals can be retained or intensified in the progeny.

The breeder should make up his mind as to the breed he considers most suitable and which he desires to establish, and then select the foundation stock from breeders whose stock come nearest to his ideal.

A keen observation of the animals he is breeding will enable him to cull his herd and select sires to fix type and character which are essential to success. Sound judgment in selection and mating and judicious feeding are necessary in the successful establishment of a profitable dairy herd.

PRODUCTION RECORDING.

List of cows officially tested by officers of the Department of Agriculture and Stock and which have qualified for entry into the Advanced Register of the Herd Book of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, the Ayrshire Herd Book of Queensland, and the Friesian Herd Book of Australia. The final tests of these cows were carried out during the months of March and April, 1931. (273 days period unless otherwise stated.)

Name of Cow.	Age.	Milk Production.	Butter Fat.	Sire.	Dam.	Owner.
		Lb.	Lb.			
AUSTRALIAN ILLAWARRA SHORTHORN.						
Wunulla Carnation	Mature	11,980·612	525·056	Robin Hood of Greyleigh	Lucy of Wunulla	H. Welch, Proston
Vida 5th of Werona	Mature	9,768·892	360·577	Young Kitchener of Burradale	Vida 1st of Waughope	J. W. Johnston, Wooroolin
Sylvia of Royston	Mature	8,400·0	374·979	Artist of Wunulla	Favourite of Royston	T. G. O'Meara, Humphrey
Daisy Belle of Rockleigh	Mature	9,235·749	378·638	,,	Queenie	T. Strain, *via* Wondai
Meg of Beechwood	Mature	8,669·25	396·545	Royal Prince of Blacklands	Maggie of Beechwood	F. W. Woolley, Moregatta
Fleecy of Beechwood	Mature	11,324·6	459·462	Royal Prince of Blacklands	Florrie of Beechwood	F. W. Woolley, Moregatta
Primrose of Dualwon	Mature	13,029·475	412·331	Dairyman of Fairfield	Nightshade 2nd of Dualwon	A. J. Caswell, Wangalpong
Midge 5th of Sunnyview	Mature	13,733·5	497·977	Diamond of Greyleigh	Midge 4th of Greyleigh	W. H. Thompson, Nanango
Princess 3rd of Oakvilla	Mature	9,858·287	397·87	British Admiral	Princess 2nd of Oakvilla	W. Marquardt, Wondai
Rosebud 3rd of Oakvilla	Mature	9,548·716	374·312	Gussie	Rosebud 2nd of Oakvilla	W. Marquardt, Wondai
Ruby 3rd of Lemon Grove	Mature	11,238·222	441·316	Dan of Greyleigh	Ruby of Lemon Grove	J. Phillips, Wondai
Myrtle 4th of Lemon Grove	Mature	15,676·647	620·662	Dan of Greyleigh	Myrtle 3rd of Lemon Grove	J. Phillips, Wondai
Silver 12th of Upton	Mature	10,717·625	388·43	Red Rose of Hillcrest	Silver 3rd of Upton	W. J. Barnes, Beaudesert
Venus 3rd of Euroa	Mature	8,807·5	358·022	Sperrys Boy of White Park	Venus of Hillcrest	H. F. Lindenmayer, Binjour
Lady 3rd of Pine View	Mature	10,001·0	357·36	Master Togo of Oakvale	Lady 2nd of Pine View	Hickey and Sons, Wilston
Pigeon of Wadevale	Mature	12,918·25	583·580	Brigadier of Burradale	Damsel of Wadevale	J. Wade, Kilcoy
Beauty 2nd of Greenhills	Mature	12,926·639	514·952	Diamond Boy of Blacklands	Beauty of Greenhill	J. W. Johnston, Wooroolin
Melba 4th of White Park (270 days)	Mature	9,448·75	352·803	Renown of White Park	Melba of White Park	W. T. Savage, Barnesmore
Beauty of Pinelands	Mature	9,650·25	454·597	Plums Boy of Mountside	Margaret of Durham Park	A. E. Vohland, Aubigny
Fancy 6th of Rosemount	Mature	9,962·45	386·634	Sunbeam of Yaraliah	Fanny 2nd of Rosemount	A. J. Bryce, Maleny
Belle of Kingsdale	Mature	9,167·8	465·47	Nellies Jellicoe of Nestle Brae	Dainty Bell of Kingsdale	A. A. King, Mooloolah
Ruby of Corunna	Mature	10,776·039	399·337	Victor 2nd of Balmoral	Champion 2nd of Corunna	Mrs. L. Handley, Murphy's Creek
Primrose XI of Greyleigh	Mature	9,990·375	393·739	Foch of Greyleigh	Primrose 4th of Greyleigh	A. Kamholtz, Nerang
Damsel of Royston (272 days)	Mature	9,163·0	355·222	Sperry 2nd of White Park	Rita of Royston	T. G. O'Meara, Humphrey
Sylvia of Royston	Mature	8,400·0	374·979	Artist of Wunulla	Favourite of Royston	T. G. O'Meara, Humphrey
Fairy of Wadevale	Mature	8,159·0	354·273	Brigadier of Burradale	Ruby of Wadevale	J. Wade, Kilcoy
Charm 2nd of Bri Bri	Senior (4 years)	10,365·55	399·495	Gay Boy of Tyrone Villa	Charm of Hillview	A. E. Vohland, Aubigny
Champion 5th of Oakvilla	Senior (4 years)	10,156·537	434·236	Victorious of Oakvilla	Champion 2nd of Oakvale	W. Marquardt, Wondai
Iris of Wadevale	Senior (4 years)	8,113·8	371·053	Brigadier of Burradale	Alma of Wadevale	J. Wade, Kilcoy
Gentle 2nd of Lynfield	Senior (4 years)	5,346·6	234·901	Royal Monarch of Blacklands	Gentle of Lynfield	F. E. Birt, Sexton
Frizzy 4th of Rosentha!	Senior (4 years)	8,612·75	355·009	,,	,,	S. Mitchell, Warwick

PRODUCTION RECORDING—*continued.*

Name of Cow.	Age.	Milk Production.	Butter Fat.	Sire.	Dam.	Owner.
		Lb.	Lb.			
AUSTRALIAN ILLAWARRA SHORTHORN—*continued.*						
Fairy of Montwairn	Junior (4 years)	10,741·45	462·325	..	Foundation cow	A. E. Vohland, Aubigny
Fan 2nd of Beechwood (264 days)	Junior (4 years)	6,588·7	317·738	Royal Lad of Blacklands	Fanny of Corlo Park	F. W. Woolley, Moregatta
Red Rose of Glengallon	Junior (4 years)	9,762·25	404·334	Jellicoe of Blacklands	Lassie 2nd of Glengallon	A. M. Bowman, Kin Kin
Donah of Springdale	Senior (3 years)	11,100·9	404·141	Lovely's Commodore of Burradale	Donah 2nd of Strathobi	V. Dunstan, Wolvi
Miss Flirt of Blacklands	Senior (3 years)	8,805·584	312·251	Sultan of Blacklands	Flirt of Blacklands	A. Pickels, Wondai
Irene of Wadevale	Senior (3 years)	6,451·9	292·647	Emblem of Oakvale	Rosebud of Wadevale	J. Wawe, Kilcoy
Dot 5th of Oakvilla	Senior (3 years)	10,480·85	406·672	Victory of Greyleigh	Dot 2nd	W. Marquardt, Wondai
Moss 4th of White Park	Senior (3 years)	8,127·875	327·305	Violet's Emperor of Hillview	Moss of White Park	W. T. Savage, Barnesmore
Pendant 7th of White Park	Senior (3 years)	7,737·375	332·932	Violet's Emperor of Hillview	Pendant 2nd of White Park	W. T. Savage, Barnesmore
Olive 10th of Cedar Grove	Junior (3 years)	10,874·375	453·09	Dandy of Ocean View	Olive 3rd of Cedar Grove	C. O'Sullivan, Greenmount
Nancy 14th of Springdale	Junior (3 years)	10,945·694	495·771	..	..	J. Phillips, Wondai
Rose 2nd of Wilga Vale	Junior (3 years)	9,666·0	375·192	Brilliant of Wilga Vale	Rose of Wilga Vale	A. E. Vohland, Aubigny
Queenie 5th of Rhodesview	Junior (3 years)	6,522·625	232·548	Birdwood of Blacklands	Queenie of Rhodesview	W. Sierkie and Sons, Helidon
Melba of Sunnyview	Junior (3 years)	10,929·29	446·425	Diamond of Greyleigh	Chance 2nd of Woodleigh	J. Phillips, Wondai
Clyde 5th of Glenthorn	Junior (3 years)	9,461·05	347·206	Blue Boy of Glenthorn	Clyde 2nd of Glenthorn	T. Shuttlewood, Peachester
Lady of Hillvale	Senior (2 years)	9,858·0	410·504	Drafter of Greyleigh	Lady II. of Fairleigh	C. Schoenfisch, Coleyville
Queenie 12th of Brooklyn Terrace	Senior (2 years)	12,968·5	579·506	Gamble of Greyleigh	Queenie 8th of Brooklyn Terrace	C. Schoenfisch, Coleyville
Starlight 3rd of Beechwood	Senior (2 years)	6,203·85	267·375	Royal Lad of Blacklands	Starlight of Beechwood	F. W. Woolley, Moregatta
Bangle 2nd of Greenfields	Senior (2 years)	7,809·279	309·198	Radiant of Greyleigh	Bangle of Greenfields	H. Welch, Proston
Fanny 5th of Norwood	Senior (2 years)	7,723·25	289·782	President of Sunnyside	Fanny 3rd of Norwood	S. R. Alcock, Wooroolin
Nellie of Lynfield	Senior (2 years)	6,755·75	270·211	Royal Monarch of Blacklands	Edie 2nd of Lynfield	F. E. Birt, Sexton
Jenny 6th of Waughope	Senior (2 years)	6,908·15	291·977	Royal of Glenburn	Jennie 2nd of Waughope	A. M. Bowman, Kin Kin
Plume 2nd of Waughope	Senior (2 years)	6,009·25	272·493	Royal of Glenburn	Plume of Waughope	A. M. Bowman, Kin Kin
Favourite 2nd of Wunulla	Senior (2 years)	8,720·25	330·323	Little John of Greyleigh	Wunulla Favourite	W. J. Barnes, Cedar Grove
Honey 2nd of Oakvilla	Junior (2 years)	7,797·963	315·52	Victory of Greyleigh	Honey	W. Marquardt, *via* Wondai
Naomi of Springdale	Junior (2 years)	8,928·3	361·512	Volunteer of Hillview	Naomi 2nd of Nestle Brae	V. Dunstan, Wolvi
Princess 2nd of Homelea	Junior (2 years)	6,880·25	263·589	..	..	J. Savage, Humphrey
Daisy XI. of Springdale	Junior (2 years)	11,194·766	461·955	..	..	J. Phillips, Wondai
Velvet of Doctors Creek (268 days)	Junior (2 years)	5,762·55	237·817	Gentle Boy of Burradale	Betty of Springvale	A. E. Vohland, Aubigny
Starlight 2nd of Oakvilla	Junior (2 years)	8,973·597	385·271	Victory of Greyleigh	Starlight	W. Marquardt, Wondai
Princess 6th of Oakvilla	Junior (2 years)	8,982·235	365·511	Victory of Greyleigh	Princess 3rd of Oakvilla	W. Marquardt, Wondai
Plover 4th of Rhodesview	Junior (2 years)	6,726·03	250·715	Birdwood of Blacklands	Plover 2nd of Rhodesview	W. Gierkie and Sons, Helidon
Pretty Girl of Blacklands (365 days)	Junior (2 years)	9,860·4	417·083	Fussy's Monarch of Hillview	Pretty Maid of Blacklands	A. Pickels, Wondai
College Rascal	Junior (2 years)	7,533·404	302·345	Fussy's Kitchener of Hillview	Rascal 7th of Thornleigh	Queensland Agricultural High School and College, Gatton
Vesta 2nd of Hillvale (150 days)	Junior (2 years)	5,829·0	270·614	..	..	C. Schoenfisch, Coleyville
Daphne of Valencia	Junior (2 years)	7,079·5	295·256	..	..	W. Turner, Riverleigh
Dulcie of Lynfield (365 days)	Junior (2 years)	7,522·75	323·22	..	..	F. E. Birt, Sexton

PRODUCTION RECORDING—*continued.*

Name of Cow.	Age.	Milk Production.	Butter Fat.	Sire.	Dam.	Owner.
		Lb.	Lb.			
				JERSEYS.		
Trinity Gem	Mature	8,827·0	450·79	Lord Ettrey of Banyule	Trinity Blue Bell	J. Sinnamon, Moggill
Trinity Jewel	Mature	10,095·0	487·847	Ginger Duke	Brunette	J. Sinnamon, Moggill
Trinity Velveteen 2nd	Mature	7,127·0	411·894	Ginger Duke	Trinity Velveteen	A. H. Dahl, Taragoola
Carlyle Pamela	Mature	7,847·35	382·044	Carlyle Larkspur King	Carlyle Melba	J. Williams, Wondai
Glenview Lady Scot	Mature	7,262·9	357·674	Noble Scot	Glenview Handsome	F. P. Fowler and Sons, Coalstoun Lakes
Christmas Lily of Morago	Mature	9,014·0	412·496	Oxford Valentine	Vixen	J. W. Evans, Boonah
Prospect Charm 6th	Mature	7,177·313	365·05	Kyora Retford Mike	Prospect Charm 3rd	T. A. Petherick, Lockyer
Oaklands Mischief	Mature	7,342·5	352·269	Ruler of Hillcrest	Oaklands Eva 10th	E. L. Melville, Toogoolawah
Yimmin Starbright	Mature	6,100·45	399·624	Starbright King of Pella	Yimmin Primrose 2nd	Burton and Co., Yandina
Dulcie of Southport	Senior (4 years)	6,294·95	328·797	Trinity Alriston Duke	Debut of Southport	E. G. Groves, Gympie
Beauty of Southport	Senior (4 years)	7,366·55	407·54	Budget	Beauty 3rd	E. G. Grooves, Gympie
Vida of Bellevue	Junior (4 years)	7,323·5	354·300	Goldfinder	Miss Verbenia of Bellevue	J. W. Evans, Boonah
Oxford Daffodil	Junior (4 years)	8,244·75	499·724	Oxford Brighton King	Oxford Palatine's Dinah	E. Burton and Sons, Wanoon
Ruby of Bellevue	Junior (4 years)	6,917·5	355·321	Goldfinder	Gem of Belle Vue	J. W. Evans, Boonah
Hope On of Woodstock	Senior (3 years)	6,117·875	304·207	Manager of Woodstock	Master's Hope 2nd of Woodstock	P. C. Henman and Sons, Mudgeeraba
Sunnyside Clementine	Senior (3 years)	6,394·65	293·492	Oxford King's Own	Sunnyside Sylvia	Matthew Bros., Pinelands, Crow's Nest
Glengarry Progressa IV.	Senior (3 years)	6,535·1	319·949	Glengarry Benedictine's Heir	Progressa 3rd	J. and R. Williams, Glencliff
Yimmin Wildflower	Senior (3 years)	5,726·1	327·526	Yimmin Starbright King	Yimmin May Flower 2nd	Burton and Co., Yandina
Ginger Meg	Junior (3 years)	7,158·0	373·7	Maggie 2nd's Hero of Wattle Grove	Melrose Countess	D. R. Hutton, Cunningham
Trinity Shamrock	Junior (3 years)	5,333·15	319·417	Ginger Duke	Dunmore Oxford Crocus	S. J. O'Keefe, Nambour
Trinity Wattle	Senior (2 years)	6,569·5	377·974	Trinity Governor	Trinity Acacia	J. Sinnamon, Moggill
Majesty's Lillian of Brooklands	Senior (2 years)	5,129·5	261·26	His Majesty of Dalebank	Linda's Fern of Brooklands	W. S. Conochie, Sherwood
Girlie of Hillview	Senior (2 years)	5,578·8	266·077	Jolly Fox of Rosedale	Bounce 2nd of Hillview	A. W. Doel, Gunalda
Silver Beauty of Southport	Senior (2 years)	6,123·767	311·146	Werribee Twylish Starbright King	Beauty of Southport	J. F. Jenkinson, Goomeri
Joyce of Oakview	Senior (2 years)	5,026·6	271·24	Oakview Merry Pat	Jolly Flossie 2nd of Oakview	A. F. Birt, Gundiah
Trinity Mayoress	Senior (2 years)	4,940·9	261·572	Ginger Duke	Trinity Sultane's Lass	E. J. O'Keeffe, Nambour
Trinity Gerbera	Senior (2 years)	4,824·2	240·004	Ginger Duke	Trinity Wallflower	E. J. O'Keeffe, Nambour
Gleam of Ipsley	Senior (2 years)	5,806·5	357·96	Trinity Ginger Fox	Mist of Ipsley	J. A. Rudd, Corinda
Irene of Rosehill	Senior (2 years)	5,916·6	288·257	Raleighs Lad of Rosehill	Darcen of Rosehill	E. G. Groves, Gympie
Cassie of Calton	Junior (2 years)	7,438·317	335·383	Emperor of Calton	Dianthus of Calton	J. Collins, Tingoora
Trinity Candytuft	Junior (2 years)	7,008·0	377·0	Lord Ettrey of Banyule	Trinity Blue Bell	J. Sinnamon, Moggill
Prides Crystal of Burnleigh	Junior (2 years)	6,485·1	337·798	Trinity Darby	Sultane's Pride of Burnleigh	W. W. Mallett, Nambour
Westwood Buttercup	Junior (2 years)	4,369·0	235·576	Empire of Woodside	Myoora Blossom	H. Mear, Maleny
Majesty's Tibby of Brooklands	Junior (2 years)	6,361·0	304·672	His Majesty of Dalebank	Kinnahaird Tibby	W. S. Conochie, Sherwood
Oxford Aster	Junior (2 years)	5,826·625	324·3	Trinity Ambassador	Oxford Rosina	E. Burton and Sons, Wanora

PRODUCTION RECORDING—*continued.*

Name of Cow.	Age.	Milk Production.	Butter Fat.	Sire.	Dam.	Owner.
		Lb.	Lb.			
JERSEYS—*continued.*						
Westwood Fancy	Junior (2 years)	5,251·25	293·234	Empire of Woodside	Flo of Southport	H. Mear, Maleny
Glenview Lady Lyn of Woodbine	Junior (2 years)	5,607·0	260·063	Retford Thorns Viscount	Carlyle Lady Lynn	F. P. Fowler and Sons, Coalstoun Lakes
Flower Girl of Rosehill (270 days)	Junior (2 years)	4,739·1	275·105	Retford Raleigh's Chief	Trinity Bride	T. Gillespie, Ravenshoe
Oxford Snowflake	Junior (2 years)	5,782·5	300·288	Trinity Ambassador	Oxford Daphne	E. Burton and Sons, Wanora
Pineview Jewel	Junior (2 years)	5,670·375	320·847	Oxford Buttercup's Noble	Pineview Princess	J. Hunter and Sons, Borallon
Queenie of Chelsford	Junior (2 years)	5,039·5	265·768	Zenobia's Mascot of Woodstock	Sweet Clare of Chelsford	G. A. Ferguson, Woodhill
AYRSHIRES.						
Longlands Bella 3rd	Mature	10,053·958	395·71	Fairview Prince Roy	Longlands Bella	T. Holmes, Yarranlea
Longlands Isabel II.	Mature	8,721·375	357·090	Fairview Prince Roy	Longlands Isabelle	T. Holmes, Yarranlea
Jeanette of Benbecula	Mature	9,512·048	356·474	Longlands Sir Gallant	Benbecula Jean	T. Holmes, Yarranlea
Longlands Tina 5th (365 days)	Mature	13,123·625	482·791	Gallant Hero of Longlands	Longlands Iris 4th	T. Holmes, Yarranlea
Benbecula Jilt	Senior (4 years)	9,114·95	346·572	Benbecula Dairy Boy	Benbecula Jill	T. Holmes, Yarranlea
Benbecula Boronia	Senior (4 years)	10,628·058	389·194	Benbecula Dairy Boy	Benbecula Bonnie	T. Holmes, Yarranlea
Longlands Marguerite	Junior (3 years)	9,082·388	347·91	Jellicoe of Marinya	Benbecula Margaret	T. Holmes, Yarranlea
Benbecula Jaunty	Senior (2 years)	9,080·960	328·319	Nero of Bellvue	Benbecula Jill	T. Holmes, Yarranlea
Benbecula Maureen	Junior (2 years)	6,844·65	237·414	Benbecula Nero	Longlands Marguerite	T. Holmes, Yarranlea
Benbecula Janet (259 days)	Junior (2 years)	9,013·483	353·288	Bellvue Nero	Benbecula Jessie	T. Holmes, Yarranlea
FRIESIAN.						
College Princess Pontiac	Mature	19,322·0	643·564	Pabst Pontiac Blue Star	College Prima Donna	Hickey and Son, Wilston
Dairymaid 3rd of Oaklands	Senior (4 years)	10,779·658	417·865	Prince Colantha 2nd of Ryfield	Oaklands Dairymaid	W. Richters, Tingoora
St. Athan Bee	Senior (3 years)	14,143·429	442·432	Pied Rock	St. Athan Belle 3rd	G. Newman, Wyreema
Oaklands Holly 4th	Junior (2 years)	8,018·604	312·657	Oaklands Prince Colantha	Hollyhock 2nd of St. Athan	W. Richters, Tingoora

General Notes.

Butter Board.

The Deputy-Governor, acting for and on behalf of His Excellency the Governor, in Council, has approved of the issue of an Order in Council extending the operations of the Butter Board for a further period of three years, from 1st July, 1931, to 30th June, 1934.

Levy for Banana Board.

The Governor in Council has approved of the issue of an Order in Council renewing for a further twelve months the levy for the maintenance of the Banana Industry Protection Board.

Assessment at the rate of 1½d. per case containing 1½ bushels or less for all bananas marketed in the case, and 2d. in the £1 or part thereof on the proceeds of sales of all bananas marketed in the bunch, was levied during last year, and this will again be enforced this year.

Wheat Board Election.

The election to fill the vacancy for District No. 4 on the State Wheat Board, caused by the lamented death of the late Mr. J. T. Tod, resulted as follows:—

John Edward Nussey (Allora)	383
John Edwin Maher (Allora)	119

Mr. Nussey will therefore be appointed to hold office for the term ending 31st August, 1932.

Queensland Canegrowers' Council.

His Excellency the Governor in Council has approved of the issue of an Order in Council under "*The Primary Producers' Organisation and Marketing Acts*, 1926 *to* 1930," amending a previous Order in Council which enumerates the powers of the Queensland Canegrowers' Council. The new Order adds a further provision to the effect that the powers and duties of the Queensland Canegrowers' Council (which are undertaken in co-operation with the Department of Agriculture, District Canegrowers' Executives, Mill Suppliers' Committees, and others) shall include that legal advice and assistance for growers or others upon any matters of importance to the sugar industry and sugar-cane growers, shall be provided.

Regulations have also been approved under the abovementioned Acts, and these embody the Rules and Regulations of the Queensland Canegrowers' Council, District Canegrowers' Executives, Mill Suppliers' Committees, and also describe the conduct of the business of the Annual Conference of the Sugar Industry or any special conference. They deal with the procedure at meetings of the Council and its various units, and state the objects, powers, and functions of the District Canegrowers' Executives and Mill Suppliers' Committees.

Banana Leaf Spot.

The Minister for Agriculture and Stock (Mr. H. F. Walker) recently made reference to the fact that the plant pathological staff of the Department had for some time been devoting considerable attention to the investigation of banana leaf spot. A progress report has now been completed and will appear in an early issue of the "Queensland Agricultural Journal." Attention has also been more recently directed to the question of the effect of arsenical spraying for weed control on the prevalence of leaf spot in banana plantations. This aspect of the problem was discussed at the last meeting of the Banana Industry Protection Board, and the effect of arsenical sprays on the development of the spores of the fungus responsible for banana leaf spot is now under investigation in the departmental laboratories. The chief point under consideration is the extent, if any, to which arsenicals sprayed on weeds and trash on the ground will reduce infection of the living plant tissue. Obviously, if such arsenical sprays as are suitable for weed control prove on investigation to be capable of reducing the numbers of banana leaf spot spores in the plantations to an extent sufficient to reduce infection, the sprays can be applied only to the weeds and dead trash on the ground. Any application of the sprays to the living plant would be disastrous.

Staff Changes and Appointments.

The following have been appointed members of the Southern District Stallion Board:—J. A. Rudd, L.V.Sc., Melb. (Chairman), S. H. Harding, P. Short, and J. Sprott.

Mr. James Anderson, of Caloundra, has been appointed an honorary ranger under the Animals and Birds Acts.

Constable James McAfee, Stonehenge, via Longreach, and Constable A. V. Tanner, Mount Molloy, have been appointed also inspectors under the Slaughtering Act.

Mr. H. C. Quodling, Director of Agriculture, Department of Agriculture and Stock, has been appointed manager of the Agricultural Bank, Brisbane.

Constable E. A. Bauer has been appointed also an inspector under the Slaughtering Act at Ewan.

Messrs. C. T. White (Government Botanist) and W. D. Francis (Assistant Government Botanist) have been appointed also honorary rangers under "*The Native Plants Protection Act of* 1930."

Messrs. H. J. Freeman (Senior Instructor in Fruit Culture, Cairns), H. St. J. Pratt (Instructor in Fruit Culture, Stanthorpe), and W. D. Wilson (Ranger, Animals and Birds Acts, Brisbane) have been appointed collectors of royalty under the Animals and Birds Acts for the present opossum season.

Mr. Arthur Patrick Donnelly has been appointed canegrowers' representative on the Farleigh Local Sugar-cane Prices Board, vice Mr. Philip Kirwan, resigned.

The resignation of Mr. C. H. Jorgensen as cane tester at Millaquin Mill has been accepted. Mr. T. D. Cullen, cane tester, has been transferred from North Eton Mill to Millaquin Mill, and Miss Olive Knight has been appointed cane tester at North Eton Mill.

Miss Veronica Page, assistant cane tester, Moreton Mill, has been transferred to Racecourse Mill as from 29th July, 1931, and the following have been appointed assistant cane testers at the mills as under:—Miss Margaret Thorburn, South Johnstone Mill (23rd July, 1931); Mr. R. D. Woolcock, Qunaba Mill (7th August, 1931); Miss Doris Aldridge, Moreton Mill (28th August, 1931).

Mr. R. A. Tarrant, instructor in agriculture, has been transferred from Atherton to Brisbane.

Mr. A. Hamilton, instructor in agriculture, at present attached to Townsville, will be attached to Mareeba.

Mr. William H. Braun has been reappointed an acting inspector of stock at Dallarnil, as from 1st August, 1931.

Mr. Arthur Smith, the Manager of Cooroorah Station, via Blackwater, in the Emerald district, has been appointed an Honorary Ranger under the Animals and Birds Acts.

Mr. O. J. Wallin, of Deception Bay, has also been appointed an Honorary Ranger under the abovementioned Acts.

The Officer in Charge of Police at Esk has been appointed an Acting Inspector of Stock.

Mr. K. King, Agent under the Banana Industry Protection Act, will be transferred from Rockhampton to Maryborough, as from the 1st August, 1931.

The Governor in Council has approved that all rangers under the Animals and Birds Acts, inspectors of stock, slaughter-houses, dairies, and plants, be appointed also honorary rangers under and for the purposes of "*The Native Plants Protection Act of* 1930," as from the 25th July, 1931.

Acquisition of Tomatoes by C.O.D.

The Governor in Council has approved of the issue of a Regulation under the Fruit Marketing Organisation Acts, which provides for a ballot to be taken on the question of the acquisition of tomatoes by the Committee of Direction of Fruit Marketing. The ballot will be conducted by the Committee of Direction, and will close at noon on the 31st August, 1931. Growers concerned for the purposes of the poll will comprise all persons, not being persons engaged in the growing of tomatoes as employees on wages or piecework rates, who have, and who sign a declaration that they have, at the date of the poll, tomatoes growing in certain specified areas for market.

License to Manufacture Arrowroot Flour.

Regulations under the Primary Producers' Organisation and Marketing Acts have been approved which provide that no person shall manufacture arrowroot flour unless he holds a license to do so issued by the Arrowroot Board with the approval of the Minister. A license may be issued for such period as the Board shall determine, but the period shall not extend beyond the term of the Order in Council which provided that arrowroot flour should be placed under the control of the Board. Application for a license must be made to the Board before manufacturing commences, and such licenses may be cancelled at any time. No fee is necessary for a license, and no license is transferable.

C.O.D.—Sectional Group Elections.

On the 27th June, 1930, Regulations 74, 75, and 77 under the Fruit Marketing Organisation Acts, setting out the electorates for the annual elections of the pineapple, citrus, and other fruits sectional group committees, were approved. For the elections this year, in the cases of the abovementioned sectional group committees, the desired electorates are slightly different. The electorates recognised in 1929 and 1930 for the banana and deciduous sectional group committees also differ slightly this year, and accordingly, regulations have been issued rescinding Regulations 73 and 76 dated 8th August, 1929, and 74, 75, and 77 made last year, and substituting new ones therefor. These new regulations set out the electorates which will be recognised for the forthcoming elections of the banana, pineapple, citrus, deciduous, and other fruits sectional group committees.

The Royal Society of Queensland.

At the July meeting of the Royal Society of Queensland, the President, Dr. D. A. Herbert, occupied the chair, and about thirty members and visitors were present. Messrs. B. Blumberg, D. Fison, and Cummings were unanimously elected ordinary members of the Society. Mr. R. Wilson was proposed for ordinary membership by Messrs. Bick and Perkins.

Mr. G. H. Hardy read a paper entitled "Aphididae in Australia."

This paper gives an account of the Aphides found to occur in Australia, only one being regarded as definitely indigenous. Twenty genera are recorded, those of the subtribe Pentalonina being treated in full. A list of identified aphides and their host-plants is given, and also a list of indigenous plants found harbouring aphides in Queensland.

Mr. C. T. White exhibited specimens of three species of *Aceratium* all from North-eastern Queensland. The genus was previously only known to consist of twelve species, ten in New Guinea, one in the Moluccа Islands, and another in the New Hebrides. The genus belongs to the family Elaeocarpaceae and has not previously been recorded for Australia. Descriptions of the Australian species have been drawn up and will be published at an early date.

Dr. Bagster performed a very interesting experiment, using ether to demonstrate critical phenomena in a liquid-gas system.

Mr. H. J. Hines demonstrated (*a*) a new colormetric method for the determination of P_2O_5 and As_2O_5 (Zinzadze. Z. Pflanz. Düng., 1930, 16A, 129); (*b*) an electrical method for the reduction of draft in ploughing (Crowther and Haines J. Agric. Sci., 1924, 221); (*c*) the Zeiss Cardiod Condenser.

Dr. Herbert exhibited (*a*) *Nostochopsis lobatus* Wood, a blue green Alga from the Albert River; (*b*) *Rafflesia manillana* flowers collected at 2,000 feet altitude on Mount Maquiling, Philippine Islands; this plant is parasitic on *Cissus* sp. and the flowers only are external, the vegetative parts being reduced to strands in the host tissues; (*c*) on behalf of Mr. L. F. Hitchcock a specimen of the bark of *Sterculia* sp., from the West Indies, prepared to show the reticulated rings of bast fibres.

Mr. Perkins exhibited (*a*) a female gall of *Apiomorpha excupula* Full. (Fam. Coccidae) on *E. paniculata* collected at Bauple, Q., by Mr. F. Sheldon Stringer; this is a new record for the State and also a new host record; (*b*) specimens of the Buffalo Fly (*Lyperosia exigua*) collected on Mornington Island by Dr. I. A. Mackerras.

Mr. McCall exhibited an Analytic Quartz Lamp. This is a mercury vapour lamp so fitted with two Wood's filters that ultra violet rays are projected horizontally and vertically. The vertical rays fall inside movable black curtains, so that specimens may be examined for fluorescence in daylight. The effect of the ultra violet rays was shown on various drugs and chemicals, also on minerals and precious stones.

Control of Brumbies.

The Diseases in Stock Act Amendment Act which was passed last session of Parliament provides, amongst other things, for the destruction of brumbies on stock holdings in Queensland under certain conditions. The provisions, however, apply only to such portions of the State as are proclaimed by the Governor in Council, and are limited to a period of not more than four months in any year.

The Governor in Council has approved of a Proclamation declaring the Cloncurry stock district to be a district in which the provisions relating to the destruction of brumbies shall apply, but such provision shall apply in this district only for four months—from 1st August, 1931, to 30th November, 1931.

Destruction of brumbies, therefore, may be carried out in this district by stock owners at any time during the four months stipulated, provided that all formalities required by the Acts have first been observed.

Northern Pig Board—Traffic in Pigs.

An Order in Council under the Primary Producers' Organisation and Marketing Acts has been issued to deal with the traffic in pigs on the Atherton Tableland. The Acts now provide that all pigs grown in the Petty Sessions districts of Atherton, Herberton, Chillagoe, Cairns, Douglas, and Mourilyan must be delivered by the growers to the Board or its agents by the nearest road or railway, under conditions fixed by the Board by notice published in any newspaper circulating in the district. Except for delivery to the Board or its agents, a grower must not remove any of the commodity from his premises without the prior consent of the Board; any person doing so will be liable to a penalty of not more than £500.

No person shall remove any pigs except with a permit from the Board authorising him to do so. This permit will give the conditions and the period of duration for such removal, as determined by the Board. The Board may refuse to grant a permit without giving reasons. The permit must always be carried, and must be produced for inspection by any member or inspector of the Board or member of the Police Force. The Board may appoint persons to be inspectors.

Any member or inspector of the Board, or police officer, may at any place within a radius of 50 miles from the boundary of the area concerned, examine any vehicle suspected of carrying any of the commodity, may order the driver to stop for sufficient time to allow any goods carried to be inspected, and may seize any of the commodity found. Any person disobeying such orders shall be liable to a penalty not exceeding £500.

In any prosecution, the averment that pigs concerned are part of the commodity will be deemed to be proved in the absence of proof to the contrary. The Commissioner of Railways or any shipowner may, on the request of the Board, without incurring liability, refuse to carry any of the commodity, except interstate consignments.

Cotton Seed Importations.

The Minister for Agriculture and Stock (Mr. H. F. Walker) in a recent announcement stated that, following upon the request of a deputation of the members of the Cotton Board and grower representatives of the Central Queensland districts, he had inquired in both this country and in the United States of America as to the possibility of importing large quantities of cotton seed for planting purposes without risk of introducing dangerous insect pests and diseases. These inquiries have now been finalised, and it would appear that both the Commonwealth Quarantine Authorities and the United States Department of Agriculture are in agreement that there is no known fumigation treatment of cotton seed intended for planting purposes that can be guaranteed 100 per cent. effective. Having received such information, Mr. Walker stated he could not see his way clear to import 20 tons of seed, as requested by the deputation. As he had stated previously, it appeared that seed for a very large acreage would be applied for this season. The Australian spinners were also steadily increasing their output, so it would appear that both the cotton growing and spinning industries were developing to their rightful importance. When one traverses the districts where cotton has been grown successfully it could be appreciated to what dimensions the industry might develop. He was extremely anxious, therefore, that every possible step should be taken to prevent the future of it from being jeopardised. Insect pests and diseases already in Queensland were yearly taking serious toll from the cotton growers, and he did not want to do anything which might introduce more serious trouble.

He had accordingly cabled to the United States Department of Agriculture asking that 100 lb. of seed of each of the three most promising varieties which were introduced this last season be sent as early as possible. These amounts would allow of at least 10 acres of each variety being planted. As the increase from this past season's ¼-acre test plots would allow of around 15 acres of each variety being planted, it could be seen that with reasonable conditions sufficient seed would be available in the following year to plant several hundred acres of each.

Concluding, the Minister stated that he felt it to be far better to proceed in a cautious manner than make introductions of large amounts. It had to be remembered that all seed had to be planted in quarantine plots and all plants carefully examined. The acreage which the three 100-lb. lots could plant would be of such size that a careful enough inspection of it could be obtained to give reasonable assurance that any seed released would be free of serious pests or diseases.

Regulation Regarding Introduction of Poultry from Other States.

Early this year a regulation was passed under the Diseases in Poultry Act to prevent the introduction into Queensland of Newcastle disease of poultry (or pseudo-poultry plague) which was then prevalent in Victoria. Existing regulations at the time provided that poultry could only be introduced into Queensland on production of a declaration by the owner that such poultry were entirely free from disease and during the preceding three months had not been in contact with diseased poultry. Such declaration was accompanied by a certificate from an inspector of poultry whence the birds had come stating that he had examined them and had no reason to doubt the declaration.

However, when Newcastle disease broke out in Victoria, these regulations were amended to provide that as well as producing the declaration and certificate as above the owner of the poultry had also to produce a certificate from the Chief Inspector of Stock or Chief Veterinary Surgeon in the State from which the poultry had come stating that there had been no outbreak of Newcastle disease in that State in the preceding twelve months, and that such birds were the product of such State or had been in the State in the last preceding twelve months. In addition, he had also to deliver a permit to import issued by the Poultry Expert of the Department of Agriculture and Stock, Brisbane.

Victoria has now been declared free of Newcastle disease of poultry, and accordingly the restrictions against the introduction of poultry into this State have been withdrawn. A regulation has been issued to-day rescinding the regulation issued early this year, and this new regulation requires similar procedure regarding the introduction of poultry from other States as did the regulation which was in force previous to the outbreak of Newcastle disease of poultry.

Two Methods of Tanning Fur Skins.

Cut off the useless parts of the skin, and then soften it by soaking, so that all flesh and fat may be scraped from the inside with a blunt knife. Soak the skin next in warm water for an hour, and during that time mix equal quantities of borax, saltpetre, and Glauber salts with enough water to make a thin paste. About ½ oz. of each ingredient will give enough for an opossum skin, and proportionately more will be required for larger ones. When the skin has soaked in the warm water, lift it and spread it out flat, so that the paste may be applied with a brush to the inside of the skin; more paste will be required where the skin is thick than where it is thin. Double the skin together, flesh side inwards, and place it in a cool place for twenty-four hours, at the end of which time it should be washed clean, and treated in the same way as before with a mixture of 1 oz. of sodium carbonate (washing soda), ½ oz. borax, and 2 oz. hard white soap; these must be melted slowly together without being allowed to boil. The skin should then be folded together again and put in a warm place for twenty-four hours. After this dissolve 4 oz. alum, 8 oz. salt, and 2 oz. sodium bicarbonate (baking soda) in sufficient hot water to saturate the skin; the water used should be soft, preferably rain water. When this is cool enough not to scald the hands, the skin should be immersed and left for twelve hours; then wring it out and hang it up to dry. The soaking and drying must be repeated two or three times, till the skin is soft and pliable, after which it may be rubbed with fine sand-paper and pumice-stone to obtain a smooth finish.

A second method, in which wattle-bark is the tanning agent, is not so quickly accomplished, but properly adopted it should give better results than the other. Collect some wattle-bark and make a strong decoction by boiling or steeping the bark in water. A bushel of crushed bark from a tannery, if one is near at hand,

will be found an easy way of getting the best bark. The skin should be scraped clean on the inside, as in the "lightning process" before steeping begins. It is best to let the skins lie as flat as possible while soaking; and a large, square, zinc-lined packing-case is therefore preferable to a barrel. The skins should be thoroughly covered by the liquid, which must either be changed once a week, or boiled anew and skimmed. While the skin is out of the liquid each week it should be lightly scraped. Large skins take up to six weeks to tan well, but opossum skins will not require more than a month.

Tanning Hides.

First, the hide should be put in a mixture of lime and water, so that the hair can be scraped off easily. The hide should then be laid on a flat and clean surface and scraped on both sides to take off the hair, fat, meat, &c. It should then be left in clean water until the tan liquid is ready. The liquid consists of one 4-gallon bucket of wild peach or quondong bark added to 20 gallons of water. When cold, the hide can be immersed in the solution. Care should be taken that the tan is not too strong until the hide commences to show the colour of the liquid. Then the liquid can be made as strong as possible by adding more scalded bark. The addition of three buckets of bark will in most cases prove sufficient. All that remains to do is to air the hide once a week. The process will take three to four months. Care should be taken when airing the hide that it is not allowed to become dry and stiff. When the hide becomes heavy it is a sure sign that it is nearly tanned. After the side is tanned, it should be washed in two or three waters, but not allowed to become dry until the dressing is applied. When the tanner is applying the dressing—a mixture of mutton fat and beeswax—the hide should be hung over a rail, and the dressing well rubbed into the leather on the flesh side with a block of wood. The hide can then be left to dry until required for use. If the dressing is not applied, the leather will become hard and wrinkly, and will stretch, crack, and break when used. Any red bark will tan leather. Tanning a rabbit skin will take three weeks, a kangaroo skin six to eight weeks, and a hide three months.

How to Kill a Local Producers' Association.

Evidently the following nineteen suggestions for killing an association were written by one with experience in such matters, says the "Live Stock Journal."

1. Don't come to the meetings.
2. But if you do, come late.
3. If the weather doesn't suit you, don't think of coming.
4. If you do attend a meeting, find fault with the work of the officers and other members.
5. Never accept an office, as it is easier to criticise than to do things.
6. Nevertheless, get sore if you are not appointed on a committee, but if you are, do not attend committee meetings.
7. If asked by the chairman to give your opinion regarding some important matter, tell him you have nothing to say. After the meeting, tell everyone how things ought to be done.
8. Do nothing more than is absolutely necessary, but when other members roll up their sleeves and willingly, unselfishly use their ability to help matters along, howl that the association is run by a clique.
9. Hold back your subscriptions as long as possible, or don't pay at all.
10. Don't bother about getting new members. Let the secretary do it.
11. When a dinner or luncheon is given, tell everybody money is being wasted on "blow-outs" which make a big noise and accomplish nothing.
12. When no repasts are given, say the association is dead and needs a can tied to it.
13. Don't ask for a dinner or luncheon ticket until all are sold.
14. Then swear you've been tricked out of yours.
15. If you do get a ticket, don't pay for it.
16. If asked to sit at the speaker's table, modestly refuse.
17. If you are not asked, resign from the association.
18. Don't tell the association how it can help you, but if it doesn't help you, resign.
19. Keep your eyes open for something wrong, and when you find it, resign.

Where to Stay in Brisbane.

A convenient rendezvous for country people when visiting Brisbane is the Gresham Hotel in Adelaide street, near the Central Railway Station, and right in the centre of the city. There will be found all the amenities of a modern hotel, besides an atmosphere of genuine hospitality and real homeliness which no doubt accounts for the great popularity of "The Gresham" with the travelling public.

Well Balanced Rations Necessary in Pig Feeding Value of Meat Proteins and Minerals.

The pig feeding trial conducted recently by the Department of Agriculture and Stock, demonstrated that maize, wheat, and barley all give satisfactory returns and produce first-grade bacon when used in rations balanced with protein-rich foods such as separated milk, and when minerals are included in the ration.

These results are of considerable interest to farmers, but when there is a scarcity of separated milk, the pig raiser must have some protein-rich food to take its place in balancing the grain in the ration and this substitute is readily available in the form of meat and bone meal (as Borthwick's "Mebo" meal advertised in this Journal). This Queensland-made stock food is in a very concentrated form, containing 54 per cent. protein and, owing to its percentage of bonemeal, is rich in phosphorous and lime, which are necessary minerals in animal nutrition.

"Mebo" is made fresh daily from the meat of cattle which are inspected by Government inspectors, and being free from possible disease infection is absolutely a safe food for pigs. Being such a concentrated food, it is only required in a small proportion in the ration and thus its use is quite economical. When separated milk is in short supply ¼ lb. to ½ lb. of "Mebo" might be fed daily to each 100 lb. of live pig.

All good pig feeders supply their pigs with a mineral mixture to ensure health, freedom from worms, and rapid growth in the stock.

Experimental work throughout the world has demonstrated the value of a complete mineral mixture for pig feeding, and wonderfully rapid growth has been recorded in pigs fed on well-balanced rations which include ample minerals.

Borthwicks' "Bonolik" is a well-blended mixture of such materials as sterilised bonemeal, salt, sulphur, sulphate of iron, sulphate of magnesia, and potassium iodide, all of which are known to be essential to the wellbeing of the pig.

Borthwicks' "Mebo" meal for use in place of separated milk and in conjunction with whey, and Borthwicks' "Bonolik" as an insurance of health and rapid growth in pigs have been on the market and in common use for some years, and their popularity testifies to their value.

"Mebo" meal and "Bonolik" may be fed either wet or dry in any combination of foods. Further particulars regarding their use will be freely given upon application to Messrs. Borthwick and Sons (Aust.) Ltd.

How to Feed.

Pigs.—Wheat, like maize, needs the addition of a supplement when fed to pigs. Any palatable roughage rich in protein is satisfactory. If the pigs are on good grass or lucerne pastures they will make rapid and economical gains when wheat is added to the diet. When stall-feeding with wheat it is advisable to include in the ration a food of animal origin that is rich in protein, such as skim-milk. Field peas are also of great value for feeding with wheat.

The wheat should be ground or rolled for pigs. This treatment has the effect of greatly increasing the feeding value. It should not be ground too finely, as it then tends to form a sticky mass in the mouth of the pig. Soaking the wheat is of very little value, and does not justify the trouble involved; moreover, it is not nearly so satisfactory as grinding.

Lambs.—The best results are obtained with lambs when the wheat is fed with legume hay. This has the effect of balancing the ration. Wheat fed to lambs on good pasture gives good results.

Cattle.—Wheat should be fed with some bulky concentrate for the best results with dairy cattle. It should be ground or rolled for all cattle.

Horses.—Wheat should be fed only in moderate amounts and mixed with a bulky concentrate or with chaffed forage. If fed in excess it may cause digestive troubles and skin eruptions.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

MEAT.

Mankind have always had a fondness for meat, when they could get it, on account of its rich savoury flavour. This is utilised in beef-tea, broths, and meat extracts, which have no nutritive value in themselves, as a vehicle for making other foods attractive. Meat is a source of iron, which is necessary for the formation of red blood. Iron is not contained in sufficient quantity in milk, but can be obtained equally well from egg yolk and green vegetables. The vitamins of meat will be discussed presently. It is as a source of proteids (body building foods) that meat is most valuable.

What the Child Requires.

Experience has shown that a liberal supply of proteids is necessary for the best physical development. They are most needed during childhood, youth, and adolescence. After growth has been completed proteids are only needed for repair of bodily waste, and a smaller quantity suffices. Especially after middle age we need little. As their name implies, proteids are of very varying as well as very complex chemical composition. We may classify our foods according to their value as sources of proteids as follows:—(1) Milk and cheese, (2) eggs, (3) meat, (4) fish, (5) peas and beans, (6) bread. Meat takes only the third place, not that in which it is placed by popular estimation.

Gluttony a Deadly Sin.

Because it is rich and savoury, meat is often eaten to excess. One holiday season I sat at a table for a few days with three stout women past middle age. They ate meat at every meal—that is, three times a day—large navvy's helpings. The other food they took, though not so conspicuous in quantity, would have been quite enough for their needs, without any meat at all. Between courses they talked about their ailments. They had a very firm belief that by eating plenty of strong food they were increasing their own strength. In reality they were inviting disease and shortening their lives. In the middle ages, gluttony was a sin; now we call it good living. Our forefathers were nearer the truth.

A Lesson from the Lion.

By meat most people mean steaks, chops, and joints—that is to say, fresh meat, which is muscle meat. Now, muscle is a very specialised animal tissue, and one of its peculiarities is that it contains scarcely any vitamins. It is a very serious thing that bread and meat, which are popularly supposed to be the two main foods, do not contain the vitamins necessary to support life. It is fortunate that we live on mixed diets, for on bread and meat alone we should soon die from some infectious disease. It is to be feared that many are unknowingly trying to exist on diets in which vitamins are relatively deficient, and that their health suffers in consequence. In contrast to flesh meat, liver, kidney, and other internal organs are extremely rich in vitamins, and are much more valuable food, though many people despise them. Savages and wild beasts know much better. When the lion has made his kill, he eats the liver, kidneys, heart, and lungs, together with any fat distributed among them. After this he carries the paunch and entrails away and hides them. Should he then not be satisfied, he returns to the carcass and takes away some of the flesh meat. All the rest he leaves to the jackals. But the jackals cannot live on flesh meat alone. They obtain the vitamins they require from ostrich eggs and ostrich chicks. Where there are no ostriches or other sources of vitamin containing food, jackals cannot live on the lion's leavings. We might learn something, even from lions and jackals.

YOUTH AND THE FARM.

The worst mistake made by the majority of our people is the lack of encouragement given to the boys, and even the girls, of the family to become really interested in farming or the sidelines of farming. The result is that the brainiest and most progressive boys look to city occupation, while the girls too often avail themselves of the first opportunity to obtain a little independence. No human being with any spirit at all could be content to go on working from year to year and be treated as a child, having clothes bought for him and occasionally receiving a few shillings when he goes to town.

And because of the prevailing selfish attitude of parents many fine prospective farmers are being forced off the land, just when we want men of their calibre to assist in making dairy farming the great business it can be made in this most favoured country. In grass-land farming and in herd-building management is the big factor; it is the man behind the gun that counts. Therefore we want the brilliant boys to remain on the land, and they will remain if they are treated as self-respecting human beings.

We believe the day will come when farm girls will be encouraged to take up poultry-keeping or bee-keeping as a sideline, and many of them would if they had the necessary encouragement.

I think it is true that fathers are quite as hard to train as boys, and from experience all along the line, it seems fairly certain that fathers and boys alike will mostly go their own way, in the long run getting "what is coming to them."

But it is in the power of the father to help a boy to realise his best instead of his worst tendencies and possibilities. To this end, a father must be sympathetic and patient, helping the development of whatever natural taste or genius a boy may have. Virtue is never negative, and a boy is held from idleness or vice by giving him something better to work at. If a boy has a real love for some study or for some worthy line of work, encourage that. It marks the way out from temptation. A boy needs in his development sympathy rather than financial help. His ideals need strengthening, not his purse. To have money to burn will ruin all those who burn it.

The father can promote the plain virtues of sobriety, honesty, tolerance, and kindliness. The most effective way of teaching these virtues is for him to illustrate them in himself to show how righteousness looks when it is lived. Right living can be most effectively taught not by precept but by practice. And remember always that right living is a positive thing. It is secured by inhibitions.

And a father may say to his boys something like this: "Your first duty in life is towards your afterself. So live that your afterself—the man you ought to be—may in his time be possible and actual.

Far away in the years he is waiting his turn. His body, his brain, his soul, are in your boyish hands. He cannot help himself.

Will you let him come, taking your place, gaining through your experience, happy in your friendships, hallowed through your joys, building on them his own?

Or will you fling it all away, deciding, wanton-like, that the man you might have been shall never be?

This is your problem in life—the problem vastly more important to you than any or all others. How will you meet it, as man or as a fool? It is your problem to-day and every day, and the hour of your choice is the crisis in your history.—The "New Zealand Dairyman."

KITCHEN GARDEN.

Our notes for October will not vary much from those for September. Sowing may be made of most vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 feet apart with 18 inches between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Spraying for fungoid diseases should be attended to, particularly all members of the *Cucurbitaceæ* and *Solanum* families, of which melons and tomatoes are representative examples. Give plenty of water and mulch tomatoes planted out last month. Asparagus beds will require plentiful watering and a good top dressing of short manure. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

THE COUNTRY WOMAN.

By arrangement with the Domestic Science and Technical Services of the Department of Public Instruction, information of especial interest to country women is published regularly under this heading.

SIMPLE COOKING

FRIED FISH.

Materials—1 whiting; yolk of 1 egg or 1 tablespoonful milk; 1 tablespoonful bread crumbs; 1 teaspoonful flour; pepper; salt; dripping; slice of lemon; parsley.

Utensils—Bowl; knife; whisk; frying-pan; plate.

Method—

1. Scale, clean, and fillet fish; wash fillets in salt and water.
2. Dry; roll in flour, pepper, and salt.
3. Dip in beaten egg or milk and bread crumbs.
4. Fry skin side down in smoking fat.
5. Drain on brown paper; serve hot with thin slice of lemon and sprigs of parsley.

STEAMED FISH.

Materials—1 whiting; 1 teaspoonful dripping; pinch of salt; ½ teaspoonful lemon juice.

Utensils—Bowl; knife; 2 plates.

Method—

1. Wash fillets of fish in salt and water; dry them well.
2. Place skin side down on a greased plate; sprinkle with lemon juice.
3. Cover with another plate.
4. Place on top of a saucepan of boiling water.
5. Cook for 10 minutes.
6. Reverse plates; cook 10 minutes.

MEAT RISSOLES.

Materials—1 lb. cold meat; 1 tablespoonful chopped parsley; 1 tablespoonful flour; yolk of 1 egg or 1 tablespoonful milk; 2 tablespoonfuls bread crumbs; 2 pinches salt; pepper; 1 tablespoonful dripping; 1 small onion; ¼ cup of stock or water; dripping for frying.

Utensils—Knife; mincing-machine; wooden spoon; frying-pan; saucepan; plate.

Method—

1. Cut up meat into pieces.
2. Pass meat and peeled onion through a mincing machine.
3. Add chopped parsley; salt and pepper.
4. Heat 1 tablespoonful of dripping in a saucepan; add flour.
5. Stir well with a wooden spoon; add stock or water; boil till thick; add meat; remove from fire; spread out on a dish to cool.
6. Form into round balls; dip in flour and beaten egg or milk and bread crumbs.
7. Fry in smoking fat.

STEAMED ORANGE PUDDING.

Materials—¼ lb. dripping or butter; ¼ lb. sugar; 2 eggs; 1 orange; 6 oz. flour; 1 teaspoonful baking-powder; pinch of salt.

Utensils—Bowl; wooden spoon; lemon squeezer; grater; sieve; basin; greased paper; saucepan or steamer.

Method—

1. Put dripping or butter and sugar into a bowl.
2. Beat till creamy.
3. Add eggs one by one, beating all the time; add orange juice.
4. Add flour mixed with baking-powder; salt, and grated orange rind.
5. Pour into well-greased basin; cover with greased paper; steam for 1½ hours.

ARROWROOT SAUCE.

Materials—½ pint milk; 1 dessertspoonful sugar; 1 teaspoonful arrowroot; 4 drops of vanilla or lemon essence.

Utensils—Saucepan; cup; wooden spoon.

Method—

1. Put milk into saucepan; place saucepan over fire.
2. Blend arrowroot with a little cold water.
3. When milk in saucepan is at boiling point add arrowroot, sugar and essence; stir well.
4. Cook for 3 minutes; serve in a sauceboat or jug.

COFFEE.

Materials—½ pint water; 1 dessertspoonful coffee; pinch of salt; ¼ cup milk.

Utensils—Saucepan; dessertspoon; cup.

Method—

1. Put water, coffee, and salt into a saucepan.
2. Place on the fire; bring to the boil slowly.
3. Boil for 3 minutes; strain through muslin.
4. Place hot milk in a cup; add sugar.
5. Pour coffee in.

SEA PIE.

Materials—½ lb. steak; 1 dessertspoonful flour; 1 onion; 1 carrot; 1 turnip; 1 teaspoonful salt; pinch of pepper. For pastry: ¼ cup suet; 1 cup flour; ½ teaspoonful baking-powder; ½ gill water.

Utensils—Saucepan; basin; knife; chopping-board; rolling-pin; sieve.

Method—

1. Cut meat into small pieces; roll in flour; pepper, and salt.
2. Put meat into a saucepan; cover with water; add the prepared vegetables cut into dice.
3. Bring to the boil; simmer for 1½ hours.
4. Chop up suet; rub it into the flour, sifted with baking-powder and salt; mix with water into a thick paste; roll out.
5. Cover meat with pastry pressed out to the size of saucepan.
6. Make an incision in centre of pastry.
7. Place lid on; cook for half an hour.
8. Serve on a hot dish with the pastry cut into triangular pieces.

SALMON RISSOLES.

Materials—1 tin salmon; 1 egg or 1 tablespoonful milk; 1 tablespoonful lard or dripping; 1 tablespoonful flour; 2 cups bread crumbs; salt and pepper; dripping for frying.

Utensils—Tin-opener; saucepan; wooden spoon; fork; bowl; frying-pan; plates; cup.

Method—

1. Open tin; drain off liquor into a cup; remove salmon; break it up with a fork.
2. Heat lard in a saucepan; when melted, add flour; stir well.
3. Add liquor; boil for 3 minutes, stirring well; add salmon.
4. Add bread crumbs, salt, and pepper; mix well; remove from fire; allow to cool.
5. Make into small balls; dip in flour, beaten yolk of egg or milk, and bread crumbs.
6. Fry in smoking fat; drain on brown paper; serve hot.

GREEN PEAS.

Materials—1 lb. peas; ½ teaspoonful sugar; ½ teaspoonful salt; 2 sprigs of mint; ¼ teaspoonful carbonate of soda; ½ teaspoonful butter; pepper.

Utensils—Saucepan; basin; dish.

Method—

1. Remove shells; wash peas.
2. Put them into a saucepan of hot water.
3. Add mint, salt, sugar, and soda if the peas are old.
4. Boil gently without the lid for 15 minutes.
5. Drain; add butter and pepper; shake saucepan rapidly over fire; dish in a hot vegetable dish.

POTATO CHIPS.

Materials—½ lb. potatoes; ½ teaspoonful salt; ¼ teaspoonful pepper; 1 cup dripping.

Utensils—Bowl; knife; frying-pan; cloth; brown paper.

Method—

1. Wash potatoes; peel them thinly.
2. Cut into thin strips; dry.
3. Fry in smoking fat for 3 minutes.
4. Drain on brown paper.
5. Sprinkle with pepper and salt; serve hot.

BOILED CUSTARD.

Materials—½ pint milk; yolk of 1 egg; 1 teaspoonful cornflour; 1 dessertspoonful sugar; 4 drops vanilla; 1 dessertspoonful milk for blending.

Utensils—Saucepan; basin; wooden spoon; glass dish or custard cups.

Method—

1. Put milk in a jug into a saucepan half filled with boiling water over the fire; bring milk to boiling point.
2. Add cornflour blended with sugar and a little cold milk.
3. Boil for 3 minutes; remove jug from saucepan.
4. Add the beaten yolk of egg; return jug to saucepan.
5. Cook for 3 minutes, stirring all the time.
6. Add essence when cool.
7. Serve in custard cups or in a glass dish.

Note.—The white of egg may be beaten to a stiff froth, mixed with icing sugar and placed on top of the custard.

INVALID COOKERY.

Choice and Preparation of Food for Invalids.

IN cases of illness in which a doctor is in attendance the diet of the invalid is regulated by the doctor, not by the nurse. In such cases, the diet must be of a certain fixed type, and must be administered according to rule. A nurse who fails to carry out orders may cause the death of the patient.

In cases of simple ailments or slight accidents, the nurse may not have the direction of a doctor; common sense, knowledge of the patient, and the circumstances must then guide her in choosing and preparing food.

The points to be observed are—

(1) The diet must contain the right proportions of foodstuffs.

(2) The food must be easily digested.

(3) It must compensate for strain or waste caused by the disease or accident.

(4) It must be given in moderate quantities and often.

(5) Food must be served at stated times and punctually.

(6) Unused food must be removed from the sick room at once.

(7) In cases of infectious disease, remains of food must be burned without delay.

(8) For convalescents food should be varied.

(9) If change of food is inadvisable, the mode of serving it should be varied.

(10) The quality of the food must be good; milk, meat, fish, soup, and eggs must be perfectly wholesome; unripe or over-ripe fruit and vegetables must not be used in preparing food for invalids.

(11) Great care even in details must be taken in cooking for the sick; for example, better results are obtainable if earthenware vessels are used instead of those made of metal.

(12) Everything employed in preparing and serving food must be scrupulously clean.

Notes on Certain Preparations Used in Invalid Diets.

Jelly is of little use as food; animals fed on prepared gelatine die as soon as those not fed at all; milk jelly is only of the same value as the milk it contains.

Beef tea is not a food, it is a stimulant; to give beef tea alone to a sick person is to give him a stone when he asks for bread. (Dr. Fothergill, Author of "Dietetics.")

Stimulants are not foods; they are substances which enable the individual to make use of the energy stored up in fat and muscle. The stimulants commonly used are alcohol, tea, coffee, beef tea, and extracts of meat, such as bovril. Some of these substances are used to tide over a critical period in acute disease, or to stimulate digestion in a chronic case. Stimulants are given in small quantities at a time and at such intervals that the second dose is given before the effect of the first has worn off.

Some remedies are food, not physic. Cod liver oil is an example; it is the most digestible of the fats. Cream or any other fat, if it can be digested, serves the same purpose as cod liver oil.

Diet Lists.

In hospitals diet-sheets are drawn up to ensure that a patient receives the food suited to his illness and condition. These diets are given certain definite names in order that they may be referred to briefly without danger of misunderstanding.

Patients suffering from diseases or accidents which cause the temperature to rise above the normal are kept entirely on liquid food, and their diet is referred to as a fever diet. The liquid food constituting the diet is planned to be given in small quantities and often so that the nutriment needed by the patient may be supplied in the most digestible form, and so that irritation of the digestive tract may not be caused. Such irritation would result in increase of fever. The list given below as a Fever Diet is subject to modification by the doctor's orders:—

FEVER DIET.

Food.	Hours. A.M. 2	4	6	8	10	Noon : 12	P.M. 2	12.30	4	5	6	8	10	Midnight : 12	Totals in Ozs. Milk.	Water.	Cornflour.	Coffee.	Beef Tea.	Jelly.	Gruel.
Milk .. .. oz.			6				6				6			6	24	8					
and Water .. .. oz.			2				2				2			2							
Cornflour .. .. .. oz.				4											2		4				
and Milk .. .. .. oz.				2																	
Coffee .. .. .. oz.		6			6				6				6					24			
Beef Tea .. .. oz.	8					8						8							24		
Jelly .. .. .. oz.							1													1	
Gruel .. .. .. oz.										6					2						6
and Milk .. .. .. oz.										2											
															28	8	4	24	24	1	6
			Unless asleep																		

Succeeding diet lists include solid foods in the order of digestibility.

These lists are planned to suit the requirements of the patient in the different stages of sickness or convalescence.

Diets.

Article.		Hours.						Total.
		A.M.			P.M.			
		6	8	11	1	5	8	
Milk Diet—								
Porridge	oz.	8	..	..	..	..	..	8
Sugar	oz.	½	½	..	..	½	..	1½
Milk	oz.	6	2	..	..	2	..	10
Bread	oz.	..	4	..	..	4	1	10
Butter	oz.	..	½	..	..	½	..	1
Tea	oz.	..	1	..	..	1	..	2
Soup	pt.	..	..	½	..	..	..	½
Pudding	oz.	..	..	..	8	..	..	8
Gruel (sweetened) or broth	pt.	..	..	..	..	½	..	½
Note: One pint of milk twice daily for drinks	pt.	..	..	..	..	..	..	2
Fish Diet—								
Porridge	oz.	8	..	..	..	..	..	8
Sugar	oz.	½	½	..	..	½	..	1½
Milk	oz.	6	2	..	..	2	..	10
Bread	oz.	..	4	1	..	4	1	10
Butter	oz.	..	½	..	..	½	..	1
Tea	pt.	..	1	..	..	1	..	2
Soup	pt.	..	..	½	..	..	..	½
Pudding	oz.	..	..	..	6	..	..	6
Gruel (sweetened) or broth	pt.	..	..	..	..	..	½	½
Fish	oz.	..	..	..	6	..	..	6
Potatoes	oz.	..	..	..	6	..	..	6
Note: Half-pint milk twice daily for drinks	pt.	..	..	..	..	..	..	1
Meat Diet—								
Porridge	oz.	8	..	..	..	..	..	8
Sugar	oz.	½	½	..	..	½	..	1½
Milk	oz.	6	2	..	..	2	..	10
Bread	oz.	..	4	1	..	4	1	10
Butter	oz.	..	½	..	..	½	..	1
Tea	pt.	..	1	..	..	1	..	2
Soup	pt.	..	..	½	..	..	..	½
Pudding	oz.	..	..	..	6	..	..	6
Gruel (sweetened) or broth	pt.	..	..	..	..	..	½	½
Meat	oz.	..	..	..	4	..	..	4
Potatoes	oz.	..	..	..	6	..	..	6
Note: Half-pint milk twice daily for drinks	pt.	..	..	..	..	..	..	1

Vitamins and the Choice of Food.

Laboratory experiments on the feeding of animals with chemically pure foodstuffs led to the discovery that for the maintenance of life and health there must be present in the food small quantities of some unknown substances. These are called accessory food factors or vitamins. The existence of four distinct vitamins has been detected. It is shown that rickets and some other diseases are associated with a deficient supply of the A-vitamin; beri-beri is caused by the absence of the B-vitamin; and scurvy by the absence of the C-vitamin from the food. Many of the intestinal and other chronic disorders so common in civilised countries are traceable to the long-continued use of food poor in vitamins. In large towns a relatively small amount of natural foodstuffs is now consumed. Many foodstuffs are subjected to commercial processes, such as machine-milling, refining, desiccation, sterilisation, &c., and are robbed thereby of these indispensable substances.

The following table shows the distribution of vitamins in common foodstuffs:—

Accessory Food Factors or Vitamins.

TABLE OF FOODSTUFFS SHOWING VITAMIN DISTRIBUTION.

+ shows presence relatively.

Report of Committee appointed jointly by Lister Institute and Medical Research Committee.

Classes of Foodstuff.	Group A—Fat Solubles or Antirachitic Factor.	Group B—Water Solubles or Antineuritic Factor.	Group C—Antiscorbutic Factor.
Fats and Oils—			
Butter	+	..	..
Cream	++	..	..
Cod liver oil	+	..	..
Mutton fat	++	..	..
Beef fat or suet	++	..	..
Peanut oil	+	..	..
Fish oil, whale oil, &c.	+	..	..
Margarine prepared from animal fat	Value in proportion to amount of animal fat contained	..	..
Nut butters	+	..	..
Meat, Fish, &c.—			
Lean meat (beef, mutton, &c.)	+	+	..
Liver	++	++	..
Kidneys	+	+	..
Heart	++	+	..
Brain	+	+	..
Sweetbreads	+	+	..
Fish, white	..	Very slight if any	..
Fish, fat (salmon, herring, &c.)	++	Very slight if any	..
Fish, roe	+	++	..
Canned meats	..	Very slight	..
Cheese, Milk, &c.—			
Milk, cow's (whole), raw	++	+	+
Milk (skim), raw	..	+	+
Milk (dried), whole	Less than ++	+	Less than +
Milk (boiled), whole	Undetermined	+	Less than +
Milk (condensed), sweetened	+	+	Less than +
Cheese, whole milk	+	..	..
Eggs—			
Fresh	++	+++	..
Dried	++	+++	..
Cereals, Pulses, &c.—			
Wheat, maize, rice, whole grain	+	+	..
Wheat, germ	++	+++	..
Wheat, maize, bran	..	++	..
Linseed, millet	++	++	..
Dried peas, lentils, &c.	..	++	..
Soy beans, haricot beans	+	++	..
Vegetables and Fruit—			
Cabbage, fresh, raw	++	+	+++
Cabbage, fresh, cooked	..	+	+
Cabbage, dried	+	+	Very slight
Cabbage, canned	..	..	Very slight

FOODSTUFFS—*continued.*

Class of Foodstuff.	Group A—Fat Solubles or Antirachitic Factor.	Group B—Water Solubles or Antineuritic Factor.	Group C—Antiscorbutic Factor.
Swede, raw expressed juice ..	..	..	+++
Lettuce	+	+	..
Spinach, dried	++	+	..
Carrots, fresh, raw	+	+	+
Carrots, dried	Very slight	..	..
Beetroot, raw, expressed juice	..	..	Less than +
Potatoes, raw	+	+	..
Potatoes, cooked	..	..	+
Beans, fresh, raw	..	..	++
Onions, cooked	..	..	+At least
Lemon juice, fresh	..	..	+++
Lemon juice, preserved ..	..	..	++
Lime juice, fresh	..	..	++
Lime juice, preserved ..	..	..	Very slight
Orange juice, fresh	..	..	+++
Raspberries	..	..	++
Apples	..	..	+
Bananas	+	+	Very slight
Tomatoes (canned)	..	..	++
Nuts	+	++	..
Miscellaneous—			
Yeast, dried	..	+++	..
Yeast, extract and antolysed	..	+++	..
Malt extract	..	+ In some specimens	..

None in.—Lard, olive, cotton-seed, cocoanut or linseed oil, cocoa butter; cheese from skim milk; polished rice, white wheaten flour, pure cornflour, &c.; custard powders, egg substitutes, prepared from cereal products; meat extract; beer.

NOTES. Tomatoes: "In the Tomato the three vitamins A, B, C are present" (p. 102, "Vital Factors of Foods," Ellis and MacLeod).

Vitamin D (antirachitic) is present in cod liver oil, egg yolk, butter-fat, animal fats.

FRUIT PRESERVING.

It is inadvisable to make preserves from fruit gathered in wet weather or after heavy dew.

Points to be Observed in Bottling or Canning Fruit.

1. The bottles must be clean and thoroughly scalded before using; they should be put into a boiler with cold water and left in it till the water boils. Borax may be added to the water.

2. The rubbers must be perfect and fit well; two rings should be used if necessary.

3. While being filled, the jars should be placed on a wet towel folded so as to fill the hollows in the bottoms of the jars; better still, jars should be placed in a shallow vessel of hot water.

4. A knitting needle placed in the bottle helps to equalise the temperature.

5. When the bottle is filled to within half an inch of the top, a spoon or knife should be run round the sides of the jar to displace air bubbles.

6. The jars must be filled to overflowing with hot syrup, and sealed immediately.

7. Jars must not be allowed to stand in a draught while being filled and cooled; if exposed to wind they must be covered with a towel or other cloth.

8. When jars are emptied, washed, and dried, rubbers should be placed inside and the tops fastened on securely.

Syrup for Bottling or Canning.

Half a pound of sugar to one pint of water is sufficient for most fruits; for acid fruit such as gooseberries and quinces one pound of sugar may be used with one pint of water; this proportion is used if a heavy syrup is preferred. Syrup should be strained if necessary.

Time Allowed for Cooking Fruit.

1. All fruits must be cooked till tender.

2. Small fruits must be allowed to simmer slowly.

3. Hard fruits such as quinces and some varieties of pears must be cooked in water before adding the sugar; these fruits develop a better colour if allowed to remain covered till nearly cooked.

Preparation of Fruit for Bottling.

1. Any fruit that may be stewed is suitable for bottling.

2. The fruit used must be ripe, but not over-ripe.

3. It must be sorted; decayed and poor fruit must be rejected; rejected fruit if sound may be used for jam-making.

4. The fruit chosen for preserving must be washed clean; smaller fruits are then ready for bottling.

5. Larger fruits such as pears, peaches, or quinces must be peeled neatly and cut into convenient pieces; the seeds must be removed; pears and quinces should be washed after being peeled and cored; the skin of pineapples should be carefully cut off and all eyes removed; the pines may then be bottled whole, quartered lengthwise, or cut into slices; pineapples should be cooked in the bottles to retain their flavour.

Note.—Pines quartered lengthwise are said to retain most flavour.

Sealing with Wax.

Fruit may be kept in bottles, corked, and sealed with wax. The bottles must be filled with the cooked fruit and hot syrup. The corks should be softened by being dipped in hot water; they should then be forced into place and sealed with melted wax. If the wax bubbles, the bubble must be pricked and the cavity filled with wax.

For Bottling Wax.

1. Heat ½ lb. of powdered resin and one dessertspoonful of fat slowly in a tin dish; mix thoroughly.

2. For red wax add Venetian red; for blue add washing blue.

To apply wax, dip the neck of the bottle into the wax; twist the bottle round while removing it.

Wax for sealing may be made by melting together equal quantities of white wax and beeswax.

To Keep Bottled Fruit.

After fruit is bottled it must be carefully stored. The two points to be observed are—

(*a*) The temperature must be as low as possible;

(*b*) Light must be excluded.

If there is any difficulty in excluding light the jars should be wrapped in brown paper.

Jars should be examined a week after storing; if the fruit has settled and the juice is clear and free from air-bubbles, the preserves will keep indefinitely.

To Preserve Fruit in the Bottle.

1. Pack well-prepared fruit as closely as possible into glass jars.

2. Make a syrup using ½ to 1 lb. of sugar to 1 pint of water.

3. Fill up the jars containing fruit with syrup; place covers on jars loosely.

4. Place the jars on a towel or wooden rack in a boiler containing tepid water.

5. Keep the jars from knocking together by placing straw, chips, or other packing between them.

6. Allow the water in the boiler to come up to about 1 inch below the necks of the jars.

7. Boil till the fruit is cooked.

8. When the fruit is cooked, remove jars from the water and place them on folded wet towels.

9. Fill up the jars to the brim with hot syrup or fruit from one of the jars.

10. Wipe the neck of each jar; fit on the rubber; cover down and seal. If screw-top jars are used they must be screwed down at least twice while cooling and a third time before storing.

Notes.—

1. Ten to twelve minutes is enough for berries, currants, or other small fruits.

2. Twenty minutes to two or three hours may be necessary for peaches, quinces, or pears.

To Cook Fruit and Put It Into Bottles.

1. Make a syrup of ½ to 1 lb. sugar to 1 pint of water.

2. Put sufficient well-prepared fruit to fill a quart jar into the syrup.

3. Cook slowly till the fruit is tender.

4. Have bottles prepared according to direction A.

5. Wrap a towel wrung out of water round and under a bottle, put a knitting needle into the bottle.

6. Fill the bottle with cooked fruit and pour the syrup over it till the bottle is filled to the brim; remove knitting needle.

7. Fix the rubber in place; cover down lightly.

LAUNDRY WORK.

ORDER OF WORK.

(A) Preparation for Washing—

1. Mending.
2. Sorting.
3. Removing stains.
4. Soaking or steeping.

(B) Removal of Dirt—

5. Washing.
6. Boiling.
7. Straining.
8. Rinsing.
9. Bluing.

(C) Preparation for Use—

10. Starching.
11. Drying.
12. Mending (2).
13. Sprinkling.
14. Rolling.
15. Ironing or mangling.
16. Folding.
17. Airing.

(D) Care of Clean Articles—

18. Sorting.
19. Distributing.

NOTES ON LAUNDRY PROCESSES.

Sorting—

After soiled clothes are collected they must be sorted into two piles; pile A should contain articles that may be boiled; pile B those which may not be boiled.

A.	B.
(1) Table linen.	(1) Silk, white and coloured.
(2) Bed and body linen.	(2) Prints.
(3) Towels.	(3) Coloured muslins.
(4) Starched articles.	(4) Coloured linens.
(5) Muslins and laces.	(5) Flannels.
(6) Handkerchiefs.	(6) Other woollen clothes.
(7) Dusters and kitchen towels.	(7) Blankets.
	(8) Stockings.

Steeping—

Steeping preserves materials and lessens the labour of washing: the cold water and soap in which clothes are steeped softens and loosens dirt, thus making it easier to remove; less rubbing is required, therefore there is less strain on the material and less expenditure of energy.

Washing—

After being wrung out of the steeping water the clothes must be *washed* in clean warm water with soap, the cleanest things being taken first. All parts of the clothes should be well looked over; any dirty parts, such as neck and wrist bands, should have particular attention. Every part should be well soaped and one piece of material rubbed against another. A small nailbrush may be used for collars and cuffs. For heavy material, such as corduroy and moleskin, a scrubbing brush and corrugated washboard are needed. The water should be changed as soon as it becomes dirty.

Rinsing—

Both before and after boiling, rinsing is very important—before boiling, to free clothes from dirty water; after boiling, because if soap is left in the clothes it gives them a bad colour, and mixed with blue forms spots of ironmould. Tepid water should be used for the first rinsing after boiling, so as to get rid of the soap.

Boiling—

The boiler should not be more than three parts full of water. Enough soap should be shredded into the water to form a lather. When one lot of clothes are lifted out and another lot put into the boiler more water and soap must be added.

The order in which clothes should be boiled is—(*a*) Table-linen; (*b*) Cuffs, collars, and curtains; (*c*) Bed and body linen; (*d*) Handkerchiefs and towels; (*e*) Coarse things such as kitchen towels, &c.

Small things should be put loosely into a bag; this keeps them together, prevents their being torn, and is a protection against ironmould.

A period of 20 to 30 minutes is sufficiently long for boiling clothes. The water must not be boiling when the clothes are put in. It should be brought gradually to boiling point. Clothes should not be packed into the boiler too closely; there should be plenty of room to stir them about freely with a wooden stick. When boiled, the clothes must be lifted out carefully into a basket over a tub or drainer. When drained, they must be rinsed until free of soap.

Wringing—

Care must be taken in wringing, by hand or machine, not to wrench the material. Clothes must be evenly folded with selvedges together; tapes and buttons folded to the inside. To wring by hand, gather the material up in the left hand, place the right hand above the left, little fingers together, and wring from right to left the selvedge way of cloth or garment.

Bluing—

Solid or liquid blue may be used: solid is the better. The blue should be placed in the middle of a piece of flannel, a piece of calico should be put over the flannel, and the two materials tied tightly round the blue by tape or white string. The blue bag should be soaked in water and squeezed till the water in the tub is the right tint. The water should just be sufficiently blue to remove the yellow look given to clothes by soap. If blue is allowed to settle at the bottom of the tub the clothes will become streaky.

Note.—Too many clothes should not be placed at the same time in washing, rinsing, or bluing water.

Starching—

The best starch for laundry purposes is rice starch. Other kinds have coarser granules, and are not suited for fine work. Starch will not dissolve properly in cold water; it must be mixed with cold water; boiling water is then added. This causes the starch cells to burst, and a clear paste is formed.

Muslins and curtains require thicker starch than table-linen—the finer and more open the fabric the less starch it retains.

Borax is added to starch to give a gloss to linen. Wax is added to make the iron move over the fabric without sticking.

Drying—

Drying should be carried out in the open air where possible, the early morning air being the best, as it freshens and bleaches the clothes.

The clothes-lines must be firmly fixed at each end. Clothes should be hung to the line by the thickest part, and should be, as far as possible, in a natural position, a peg being firmly fixed near each end to secure them to the line.

Sheets and tablecloths should be put over the line crossways with the hem against the hem. A peg should be fastened a few inches from each selvedge, and one in the middle. Collars and cuffs may be strung together on tape, a piece of muslin or thin cotton being pegged over them to keep them free from dust or soot.

Unstarched clothes may be taken off the line, folded neatly, and placed in a clothes-basket ready for mangling.

Sprinkling, Rolling, and Cold Starching—

All starched and most unstarched clothes must be thoroughly dried and then damped so that the heat of the iron may be effective.

To Damp Clothes—

1. Spread out the clothes as flat as possible on a perfectly clean table.
2. Put a basin of clean lukewarm water on the right-hand side.
3. With the right hand sprinkle the water evenly over every part.
4. Fold each large article up evenly and neatly.
5. Pass all articles that will not be damaged through the mangle; roll up each article tightly.
6. Place in a basket, the bottom of which is covered with a clean cloth.
7. Cover over with a clean cloth; leave in a cool place.

Hints—

(*a*) Warm water is used for sprinkling, because cold water makes darkish spots appear on starched clothes.

(*b*) Small articles (such as handkerchiefs and serviettes) should be doubled, sprinkled, placed on top of one another until a fair thickness is obtained, mangled, and rolled up ready for ironing.

(*c*) Handkerchiefs may sometimes be mangled, rolled up tightly, and ironed without being dried.

(*d*) Clothes may be better ironed if they are allowed to stand for some hours after being sprinkled and rolled.

(*e*) The body of a dress shirt should be damped in the same way as other body linen, but the front and cuffs must not be sprinkled. If the linen is well damped above the cuffs and round the edges of the front, the cold starch will not enter the sides and sleeves.

(*f*) Collars and cuffs must be perfectly dry before being starched with cold starch. The cold starch must be entirely rubbed out of the linen.

(*g*) Tablecloths should be stretched into shape while damp. To do this the hems should be gathered up in the hands of two persons, one at either end, and the cloth pulled crossways until the linen lies evenly; it therefore requires two persons to fold a tablecloth correctly.

(*h*) Long lace curtains may be straightened in the same way as tablecloths, care being taken not to put too great a strain on the material.

(*i*) The fringes of d'oylies, quilts, towels, and tray cloths should be beaten while damp against the edge of a perfectly clean table to straighten the strands and to disentangle them.

(Next Month: Ironing and Folding.)

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

ROSES.

MERITS AND DEMERITS OF LEADING VARIETIES.

By G. H. HEERS, Department of Agriculture and Stock.

TO give some idea how new roses work out, I have prepared a list of all the novelties, personally tried for six years prior to 1929, with the following results:—205 tested (climbers and polianthas not included); 110 discarded altogether as being useless; 65 being further tested but mostly hopeless; 20 may be worth a place in our general lists; 10 have definitely proved worthy of recommendation and have come to stay. They are: Sou de H. A. Verschuren, Sensation, E. J. Moller, Margaret McGredy, Charles P. Kilham, Mrs. Lovell Swisher, White Ensign, Lady Helen Maglona, Empire Queen, Rapture.

I propose to give as briefly as possible, firstly, a reliable description of the leading sorts under each colour, with pointed comments for and against each variety. They will not be given strictly in order of merit, as this seems to me impossible.

Like ourselves, all roses have faults, and in consequence our impressions must vary from time to time in accordance with their behaviour for the time being; therefore, the particular variety which one may fancy to-day is superseded to-morrow, and so on.

REDS.

Red Radiance (H.T.) (Gude Bros., 1916).—Colour cerise red, an attractive night shade, and, with the exception of colour, it is like Radiance, from which it sported. The growth is excellent, foliage healthy and plentiful, and not affected by disease. Its big bouncing globular-shaped blooms are most fragrant and abundantly produced. It lends itself for cutting, and if cut early in the day before the flower is too open it holds its shape and colour for a long time. Like Radiance, it remains intact on the plant, and petals fall off together.

Comment: I should say its faults are shape, colour, and at times it burns, also, it is apt to ball, but only when not well grown and in bad weather. It is purely a garden and decorative variety, and if it is not wanted for exhibition purposes I think it is the most satisfactory red grown. A climber raised by the Pacific Rose Company (1927) promises to be of equal quality.

Etoile de Hollande (H.T.) (Verschuren, 1919).—Dark red in the bud stage, opening to bright red which does not blue. It possesses a rich muscat perfume. The growth is vigorous, erect, and clean, with large healthy foliage. Blooms freely. Although not full the petals are large and of such good substance that they hold themselves in perfect shape for a fair time.

Comment: It is a weaker rose during our hot months, both as regards colour and petalage. I rather favour this rose in preference to Hadley, mainly because of its healthy constitution under all conditions and its true colour.

Hadley (H.T.) (Montgomery, 1914).—Rich crimson to dark red with velvety texture, full and generally of perfect form, produced on long stems. Foliage attractive, and mildew proof. Sweetly perfumed. Very free flowering, generally set down as a vigorous grower.

Comment: I cannot agree about its growth being vigorous; it is often quite good, but generally I would class it as a rose of medium growth. Unfortunately, in many localities it is a bad doer, particularly on shaley, hilly country. It has pithy wood, and succumbs to scale diseases very quickly. The colour blues considerably, and it is a difficult matter to get this variety in a hard condition for pruning. Still, with all these faults, it is a grand rose. Like Etoile de Hollande, this rose took several seasons before its value was recognised in Australia. Climber raised by Teschendorff (1927) is also promising.

Sensation (H.T.)) (Joseph Hill, 1924).—Scarlet crimson with maroon markings. Very large double and lasting. Perfumed. Very free flowering, and blooms are produced on long stems, good for all purposes, especially for cutting. Strong healthy growth.

Comment: Like Hadley, this rose has pithy wood, and does not transplant too well. Colour blues. This rose has done well with me from the first year of introduction, and it is only a question whether or not it should occupy first, second, third, or fourth position.

Laurent Carle (H.T.) (Pernet Ducher, 1907).—Velvety carmine colour, strongly perfumed with old damask scent as usually found in the old cabbage type. The blooms are fairly double and of good shape in their early stage, opening to large blooms. Good spreading growth and very free flowering. Has held its popularity against all comers.

Comment: Colour is not as vivid as some of our later reds; blooms have a tendency to divide, growth inclined to spread, but this can be rectified by pruning to an eye pointing upwards, which is contrary to what is generally recommended. Nevertheless, one of the best. A climber raised by Rosen (1923) is excellent.

FRANCIS SCOTT KEY (H.T.) (Cook, 1913). (Introduced into Australia 1922).—Deep cherry-red colour, blooms perfectly shaped, extra large, and very double. Remains good for a long period. Produced singly on strong erect stems, and at its best well nigh perfect. Growth is excellent.

Comment: This rose is so very double that it is inclined to ball, though apparently this fault is not so prevalent is Queensland as in the Southern States. Owing to its slow process of opening it is liable to get soiled in rainy or windy weather, but at its best it is a faultless bloom. I am afraid that some of our judges are inclined to associate the failings of this variety when on the show bench. Undoubtedly it is a great show rose in Queensland. Named in honour of the author of the "Star Spangled Banner."

LADY HELEN MAGLONA (H.T.) (A. Dickson, 1925).—Bright crimson red with dark shadings lightening to scarlet as the flower ages. Semi-double and inclined to globular shape. Very sweetly scented. A fairly good grower.

Comment: Somewhat like the Radiance family. If not well grown stems have a tendency to be weak-necked. Nevertheless, a very fine addition.

E. J. MOLLER (H.T.) (V. A. Moller, 1923).—The colour is an intense velvety red, deepening towards black, its sheen imparts brilliancy to the colour, which is most striking. The blooms are full, of medium size, and most freely produced on long, strong, rigid stems. Growth good, free, and clean, having only an occasional thorn. Foliage excellent, and resists mildew. Described as a garden and decorative.

Comment: Lacking in scent, and buds inclined to show a flat nose in early stage, which, however, open into remarkably well-shaped blooms. This rose has so many other good qualities that it should not be condemned on this account. If in the cooler season selected buds are cut before they open out and kept indoors one will get a perfect bloom almost black in colour. A Queensland-raised variety, and, although a prophet hath no honour in his own country, this rose will yet force itself into popularity in Queensland.

YVES DRUHEN (H.T.) (Bautois, 1921).—Velvety red, very dark cup-shaped semi-double flowers. Sweet and very free flowering. Blooms produced on long stems. Growth good.

Comment: This is an excellent garden and decorative variety; probably the colour lacks the sheen found in some of the other dark reds. No shape. It is very free flowering and a good healthy grower.

HOOSIER BEAUTY (H.T.) (Dorner, 1915).—Glowing crimson with darker shadings. Blooms are fairly full, large, and carried on long stems. Very sweetly scented. Good growth.

Comment: Preferred by some growers to Hadley; undoubtedly fine when at its best. Growth irregular, inclined to be thin, and flower stems weak at times; not as consistent as Hadley.

E. G. HILL (H.T.) (E. G. Hill, 1928).—Dazzling scarlet, developing into a pure red. Good form, full and freely produced on long stems. Light perfume. Growth good.

Comment: This is the latest addition to the reds, and should the growth of this variety prove to be good I will predict a quick rise to popularity. The colour is rather more vivid than most other reds.

STAR OF QUEENSLAND (H.T.) (John Williams, 1909).—Rich velvety crimson shaded maroon. Semi-double cup-shaped flowers. Scented; good clean growth; foliage resists mildew.

Comment: This is so well known that little need be said about it. Petals are somewhat irregular in size, a good colour, and suits our climate well. Although still a favourite, it is being shoved further down the list each year.

Other reds that cannot well be overlooked are: Crusader, Dr. Hawkesworth, Etoile de France, F. J. Harrison, General McArthur, Lord Charlemont, Daily Mail Scented, Mrs. Henry Winnett, Rhea Reid, Royal Red, George Dickson.

RED AND WHITE.

PENELOPE (T.) (John Williams, 1906).—Colour of lower part of bloom is dark reddish crimson, while the centre is a creamy white. The colours are well defined, making an unique combination quite distinct from any other rose in commerce. Blooms are full and well shaped, with strong guard petals, faint tea scent. Very free flowering. Growth usually strong and bushy, but plants frequently fail to do well.

Comment: This is a grand rose in Queensland, particularly in the Central and Northern Queensland. It is subject to mildew, and the plant difficult to manage. Requires rich soil, and will do much better if left to itself; it resents the knife. The blooms are good for any purpose. The most definite two-toned rose grown.

PINKS.

Radiance (H.T.) (J. Cook, 1908).—Brilliant silvery pink, with reverse of petals carmine. Globular shape, and very fragrant. Very free flowering, and growth upright and good.

Comment: The only thing that can be raised against this most popular rose is that it usually comes flat-nosed, and therefore is seldom fit for exhibition. Its growth is excellent, being vigorous, clean, and healthy; great abundance of beautiful sweetly scented flowers, well carried on long stems. The blooms hold together on the plant, always looking attractive until exhausted, when the whole of the petals fall together, so that the fine attractive bush never looks untidy with withered and soiled blooms. If I only had room for one rose it would be a Radiance, and if I had room for twenty-four I would have at least four Radiances. Probably more at home in Queensland than anywhere else in the world.

Mad. Abel Chatenay (H.T.) (Pernet Ducher, 1894).—Bright carmine rose, shaded pale vermillion rose and salmon, the colours harmonising well. Blooms are not large, but perfectly shaped, free, and a strong grower.

Comment: This rose will give the greatest satisfaction in any collection. Every bloom is good, and comes on long stems, and if cut to prevent seed pods forming will respond quickly with fresh flowering shoots. It is a strong grower, but has a tendency to throw its main growth in one direction, making it difficult to manage near paths. The only reason I would discard this variety would be to grow it in the climbing form, which is even better.

Mrs. C. J. Bell (H.T.) (Pierson, 1917).—A sport from Radiance. The colour is a delicate shell-pink, otherwise it is a counterpart of its parent.

Comment: Where the very delicate colour is not objected to it is almost equal to Radiance and Red Radiance. It has a tendency to come too pale in the very hot weather, and I fancy that the flowering stems are scarcely as rigid as either of the other two mentioned. Dixie and Salmon Radiance are identical. Where roses are also wanted for exhibition this must go further down the list. A great trio—Radiance, Red Radiance, and Mrs. C. J. Bell. All three should be in the first dozen in this State.

Maman Cochet (T.) (Cochet, 1892).—Carmine pink, large double blooms of fine form and substance; free flowering and vigorous grower.

Comment: This variety is very popular throughout Queensland, is easy to grow, and is a consistent prize-winner. Requires light pruning, otherwise the blooms are inclined to come divided. It is scentless, and stems are often incapable of holding the heavy blooms. Very healthy, and disease resistent. The flowering stems are stronger on the climber, which is also extra vigorous.

Jonkheer J. L. Mock (H.T.) (Leenders, 1909).—Carmine buds of gigantic size, opening to enormous blooms of deep carmine, against which the reflecting petals show an inner surface of silver rose, usually of good shape, produced on very rigid stems. Clean, strong, upright growth.

Comment: This rose appears to be well suited for Queensland, and, although it balls occasionally, and may also soil during wet weather, it is a very desirable variety. Grows rather tall, and should be pruned back and outward. A good show rose, although some judges regard it as coarse. Strong foliage, but sparse on lower stems. The large, bold, two-toned blooms of this variety make a fine show in Brisbane gardens during autumn months.

Priscilla (H.T.) (A. N. Pierson, or Montgomery, Incorporated, 1922).—True rose pink, paling to a lighter shade as the flower expands. Every shoot produces a large well shaped bloom of good substance, which stands erect on a long stem; lasts well when cut. Reliable bloomer and good growth.

Comment: This rose was sent out in 1922, and it is said that the raiser withdrew it from commerce in America owing to adverse reports. If this is so it is very evident that it is much more at home in Queensland, and I am going to predict that it will become one of our most popular sorts. It certainly blues a little, and may also ball at times, but it is so good that it will be wanted wherever seen, especially amongst exhibitors. Strangely it is a cross of two whites—K. A. Victoria and Frau Karl Druschki—but both these whites had pink parents; K. A. Victoria-Lady Mary Fitzwilliam, and F. K. Druschki-Mad. Caroline Testout, which may account for the delicate shade of Priscilla.

MRS. JAMES CRAIG (H.T.) (Hugh Dickson, 1908).—Salmon rose with shadings of pale yellow, full, and of good form in early stage, opening very full; fragrant; free bloomer and a good grower.

Comment: This variety appears only to be listed in Queensland. It is an excellent rose for all purposes. The colour, which is on the dark side for a pink, intensifies with age. A strong healthy grower, and very thorny.

COLUMBIA (H.T.) (E. G. Hill, 1917).—A true bright pink, deeping with age; very full and highly perfumed. Good clean, erect growth. Flowers produced on long stiff stems.

Comment: This variety's worst fault is that the blooms frequently become crippled in the process of opening. The petals are also rather short in the centre. Nevertheless, it is well worth growing, as it gives many perfect blooms, and even the defective flowers are quite good for cutting. The climber raised by Totty (1923) is even better.

MRS. GEO. SHAWYER (H.T.) (Lowe and Shawyer, 1911).—Clear brilliant rosy pink; extra long, slender, finely formed buds. Blooms large semi-double. Free flowering and good grower.

Comment: This rose is highly prized by exhibitors on account of its size and perfect shape. Unfortunately, the plant is subject to mildew. The climber raised in 1925 is even superior.

MABEL TURNER (H.T.) (H. Dickson, 1923).—Deep salmon pink, with reflex of petals a silvery tone. The blooms are extra large, pointed, and well formed. Faint tea perfume; growth strong.

Comment: This variety is capable of producing some fine exhibition blooms, but has a tendency to come coarse and weaker in colour if plants are forced. Not free from mildew. A good rose, and deserves to be better known.

MRS. BRYCE ALLEN (H.T.) (A. Dickson, 1916).—Carmine rose; very double, and opens somewhat flat in the way of Ilchester. Strong damask perfume; growth good and healthy.

Comment: A good all-round variety, rather dark to place with pinks. Flowers mostly come several together, and if wanted for show should be disbudded.

ETHEL SOMERSET (H.T.) (A. Dickson, 1921).—Shrimp pink, edge of petals deep coral pink; large and high pointed, stiff shell shaped petals of good substance, in all forming a perfect bloom. Fragrant and a free bloomer. Growth good.

Comment: This is a fine variety, and should be better known. Its only fault is that it is subject to mildew. Occasionally we find a plant that fails in growth.

Other good pinks are: General Superior Arnold Janssen, Empire Queen, Rapture, Sunny South, Peggy Bell, Mad. Jules Grolez, Duchess of Sutherland, Mrs. Carnock Sawday, Mrs. W. E. Lenon, Mad. Segond Weber and Rose Marie in climbers (as the dwarfs of these are unsatisfactory growers).

WHITES AND LIGHT SHADES.

FRAU KARL DRUSCHKI (H.T.) (Lambert, 1900).—Pinkish buds and magnificent snow-white blooms with deep firm petals, produced on strong stems. Vigorous growth.

Comment: The best white rose of any class, whose main drawback is scentlessness. Although only semi-double, the great petals form a flower of unimpeachable shape. For best blooms the side buds should be removed when very young. Show blooms should be cut early, as this retards opening. May be kept in continuous bloom by cutting about one-third of the canes away as these ripen, to be followed by the prompt removal of flower stems back to two or three eyes. Plant requires plenty of room.

WHITE ENSIGN (H.T.) (McGredy, 1925).—Colour pure white, flushed delicate cream and buff centre; full well-shaped in early stage, and always open well, with plenty of substance. Very free flowering. Faint tea scent. Good branching growth.

Comment: Although this rose is not as pure in colour as some other whites, its general qualities make it a most desirable variety, and should be included in all collections. Fit for show if disbudded and properly grown.

WHITE MAMAN COCHET (T.) (Cook, 1897).—A white sport from Maman Cochet, with faint pink flushings. Very full, long, and finely shaped. Free flowering, and a vigorous grower.

Comment: This rose also sported with Mr. Marshall in Brisbane about the same time, and the most of those grown in Queensland are from his strain. The blooms are even superior to the pink parent, and has probably accounted for more prizes than any other variety in Queensland to date. Should be pruned lightly and not seriously disbudded, otherwise blooms are inclined to come with a confused centre.

Does well all over Queensland. The climber raised in 1907 is even better, as the stems appear to be more able to hold up the heavy blooms, which is a weakness; also, it is scentless.

Mrs. Herbert Stevens (T.) (McGredy, 1910).—Pure white, occasionally showing traces of pink on the outside. Semi-double, but holds to a fine pointed shape in the cooler weather. Tea scented, and very free flowering. Usually good growth.

Comment: The variety fails to grow well in some localities, and in such instances the blooms are thin and generally poor. If well grown will produce exquisite show blooms, which are hard to beat. It is an extraordinarily free bloomer, but unfortunately lack of petalage causes it to open up too quickly all through our summer months. The climber raised by Pernet Ducher (1922) is decidedly better, as the extra vigour appears to give the petals more stamina. I consider this variety the best white climber to date.

Kootenay (H.T.) (A. Dickson and Son, 1917).—Creamy white, shaded primrose; blooms in the way of K.A.V., but not as pure in colour. Very full, large, and rounded form, with petals of good substance. Free bloomer, with strong upright growth.

Comment: This rose is placed before K. A. Victoria on account of its better growth and profusion of blooms. It deserves to be better known, still it is not nearly as perfect as K.A.V.

K. A. Victoria (H.T.) (Lambert, 1891).—Creamy white, with a faint lemon tinge at the base of petals. Blooms are large, well formed, and seldom faulty, fragrant, and very freely produced.

Comment: This old standard variety, although handicapped with a rather weak habit of growth, is still unsurpassed for its extreme loveliness and faultlessly shaped blooms. The climber raised by A. Dickson (1897) is equally good with the advantage of growth. Mrs. H. R. Darlington and Perle von Godesberg, although carrying perhaps slightly more yellow at the base, are so nearly like K.A.V. that these need not be repeated.

Konigin Luise (H.T.) (Weigand, 1927).—Colour white with a greenish tinge, described by the raiser as a greatly improved K.A.V. Blooms are fairly full, built of large petals forming a high bloom. Good growth.

Comment: This is a new rose, showing great promise; the blooms are well up to description, and growth appears to be better than K.A.V., and altogether promises to be a great acquisition to the white section.

W. R. Smith (T.) (Smith, 1908).—Pale fresh colour, mottled with cream and pink. Blooms full and well formed. Very free; growth vigorous.

Comment: Where the colour is not objected to, this is a fine hardy variety to grow. Although fit to show, blooms are mostly squatty. The growth is extra vigorous, and few roses produce the quantity of blooms this variety does. Very healthy, and no rose is more free from mildew and other diseases. Tea scented.

Mrs. H. Brocklebank (H.T.) (A. Dickson and Son, 1907).—Creamy white with buff centre, tinted rose on outside of petals. Blooms are large double and of good shape. Strong tea scented, and very free blooming.

Comment: This is a good all-round rose, and if shaded may be turned out quite yellow, though ordinarily it must be classed amongst the light shades. A good free grower and bloomer, but not entirely free from mildew.

Antoine Rivoire (H.T.) (Pernet Ducher, 1896).—Creamy flesh, deeper in centre. Blooms are large, opening well. Tea scented. Growth strong and upright.

Comment: This is an old favourite which still has many admirers. When well grown will produce blooms of exhibition quality. Blooms last well even after opening, which accounts for the frequency with which it wins in the bud to full bloom classes. Free from mildew. The parent of quite a number of the later day roses.

Caledonia (H.T.) (Dobbie, 1928).—A pure white, splendid form, fairly full, and stands erect on good stems. Good growth.

Comment: This is a very promising new white, and unlike most white roses it has a strong honey-like perfume. It is, however, too early to definitely pronounce it as a variety of merit, though everything points to its being a good acquisition to our limited list of whites. Its growth and blooming propensities have still to be proved.

McGredy's Ivory (H.T.) (McGredy, 1929).—Creamy white, full, and of good shape, buds being high and pointed. Damask perfume; good growth.

Comment: Like Caledonia, this variety has already given us some wonderful blooms, but it is too early to predict for its future. Also known as Portadown Ivory.

Other good whites and light shades are: Mrs. Chas. Lamplough, Louise Crette, also Climbing Ophelia.

YELLOW, BRONZE, AND ORIENT SHADES.

GOLDEN DAWN (H.T.) (P. Grant, 1929).—Rich sunflower yellow, flushed with deep old rose. When open the flowers fade to lemon-yellow. Blooms large, fairly full, and of good form. Rich tea scent; free bloomer, and a vigorous healthy grower.

Comment: This rose is occasionally enriched with carmine stainings, when it rivals Rev. F. Page Roberts in colour. Its growth is all that can be desired, and it should not be long in asserting its superiority amongst yellows. Although naturally a fine vigorous grower, there are instances where the growth has been disappointing. However, this is probably due to the fact that many people, being anxious to try this new Australian variety, removed old plants to make room to plant Golden Dawn in worn-out positions. Also anticipating a big demand, nurserymen may have over propagated during the novelty period. Although it should be well grown, flowers should not be forced, as this brings coarseness and misshaped blooms. Although sent out primarily as a garden variety, it is a great show rose in Queensland.

SOU DE H. A. VERSCHUREN (H.T.) (Verschuren, 1922).—Cadmium yellow, passing to orange towards the centre. Fairly full large blooms of exquisite shape, produced singly on strong stems. Free flowering, and strongly scented. Growth good.

Comment: An improved Hybrid Tea yellow. Holds its head erect, and fades less than most yellows. Colour being intense in cool seasons. A good strong productive plant, and usually free from disease.

GOLDEN OPHELIA (H.T.) (R. B. Cant and Sons, 1918).—Golden yellow, the heart being especially rich and shading lighter towards the edge of the petals. The blooms are naturally of medium size and of perfect shape, not full; produced singly on long stems. Sweet and very prolific. Good healthy growth.

Comment: A very rich and finely shaped flower, not supposed to be large enough for show purposes, but by disbudding and growing well I have seen Golden Ophelia well nigh perfect. Its definite faults are paling in the hot weather, and it has a tendency to mildew. Always in great demand for the cut flower trade. Quite a gem.

ALEX. HILL GRAY (T.) (A. Dickson, 1911).—Pure lemon-yellow, full and of perfect shape. Free blooming and nicely perfumed. Clean upright growth and thornless.

Comment: This rose is probably the purest and the best shaped of the pale yellows. Very hardy and healthy, and produces fine show blooms of much purity, which are very reliable except that they may ball and soil in excessive wet weather. Pithy wood with long joints and difficult to prune. Growth straight and upright.

ELEGANTE (H.T.) (Pernet Ducher, 1918).—Charming yellow flowers with starry outline. Buds medium full, long pointed centre, petals reflexing perfectly. Free blooming; good strong spreading growth, with mildew-proof foliage.

Comment: Although it is not at its best during summer, it is rightly named, for its elegance of design and soft restrained colour, which does not bleach. A great show rose. Nice habit of growth. Just a few more petals would make it perfect.

REV. F. PAGE ROBERTS (H.T.) (R. B. Cant, 1921).—Coppery red buds, opening to golden yellow blooms, stained on the outside with rich salmon and carmine. The blooms are large, double, and finely formed. Very free flowering on strong stems, with healthy foliage.

Comment: A supremely gorgeous rose, developing to surpassing magnificence of size, colour, and fragrance. Very free flowering, with strong fruit scent. Growth, however, is its downfall, never looks like making a decent bush, and gradually dies back to such an extent that it is eventually dug out in disgust. However, it is so good that it should be persevered with by growing young plants, which usually do well for a couple of seasons. So far as the actual bloom is concerned, it is a real champion.

LADY HILLINGDON (T.) (Lowe and Shawyer, 1910).—Rich saffron yellow, paling towards the edges and fading as the bloom expands. The blooms are semi-double and freely produced on long wiry stems. Full tea scent. It is a good clean grower, with attractive foliage.

Comment: The blooms would be more aptly described as semi-single, nevertheless it is most attractive in the early stages. Free from mildew and should be well fed, so as to improve the flower stem. A delightful decorative and very popular with the ladies. A climber raised by Hicks (1917) has all the good points of the dwarf with the extra vigor.

MARGARET MCGREDY (H.T.) (H. Dickson, 1923).—The true colour is geranium lake or orange scarlet. The flowers are large, full, and of good form, freely produced. Growth sturdy.

Comment: This rose has every appearance of being a "Pernetiana," very thorny and foliage shiny. So far the growth and stamina appear to be quite satisfactory. The colour is wonderfully rich, and quite new in full-bodied roses. A real advance in highly-coloured roses, and can be safely recommended.

Chas. P. Kilham (H.T.) (Beckwith, 1926).—Brilliant orient red, fading to Lincoln red as it opens. The blooms are moderately full, and are produced on stiff stems. Fruit scented; fairly good growth, with healthy foliage.

Comment: One of our new highly-coloured varieties that will be always in demand. It has a tendency to grow lop-sided, and is not as sturdy as Margaret McGredy, but the colour has more brilliancy.

Mrs. Dunlop Best (H.T.) (Hicks, 1916).—Reddish apricot, with a coppery yellow base. Semi-double flowers. Very free blooming; rich tea scent. Growth vigorous, and foliage good and healthy.

Comment: Although this rose is rather thin for our summer, it is so good and rich in colour during autumn to spring that it is well worthy of a place in every collection. The foliage is dark, long and serrated, providing a nice counterpart with its colours, and is even ornamental when not in bloom. Does particularly well on the Downs.

Talisman (H.T.) (Montgomery, 1929).—Rich shadings and blendings of scarlet, pink, gold, and copper difficult to portray. It is not full, but buds stand erect on straight stems; open blooms paler, but always attractive. Foliage light-green, free, and apparently good growth.

Comment: This is the most wonderfully coloured rose ever raised, especially in its early stage. The petals are of even length, and stand rigidly, crinkling as they open. Very free blooming, and has a wonderful perfume. The growth is upright, free and wiry. Its definite fault to date is that periodically it loses much of its colour, and comes yellow, but this fault is only temporary. It is purely a decorative variety, but provided its growth does not fail us it will soon become one of the most popular roses grown.

Mevrouw G. A. Van Rossem (H.T.) (G. A. Van Rossem, 1926).—Colour orange and apricot, flamed and shaded over a dark golden yellow ground; in the early stages the reverse of petals are often bronzed. Blooms medium size, moderately full, and inclined to be globular in shape; fragrant and fair growth.

Comment: This is one of the newer roses which has improved each year. The colour is extraordinarily rich, and, although we are suspicious regarding its relationship to the Pernetianas, it appears to be growing satisfactorily, and may now be classed as very promising.

I would always recommend that room should be found for a climbing Perle des Jardins, the purest and sweetest of all yellows; also climbing Mrs. Aaron Ward and climbing Sou de Claudius Pernet should not be overlooked. Other good varieties under these colours are: Luna, Sou de Mad. Boullet, Mrs. Erskine Pembroke Thom, Mrs. Lovell Swisher, and Hugo Roller.

AN EFFECTIVE RAT TRAP.

One of the best methods of trapping rats is to get a small barrel or a water-tight chest and fill it rather more than half-full of water. Over the top spread a sack or piece of canvas, having a hole just large enough to admit a full-grown rat in the middle. Fasten it down taut all round. Spread a fairly thick layer of cork or chaff or both on top of the water, and suspend a lump of cheese, meat, or a piece of fish from under the sacking or canvas, and just beyond the reach of the rats. The stronger the scent of the bait the better. Scatter a handful of loose straw or hay on top of the box or barrel, and place a board against it so that the rats may readily find their way to the top. The barrel, it need hardly be said, should stand in a shady corner near where the rats have their burrows or run. See that they are not disturbed by cats. A little bait on the top of the trap vessel will naturally induce them to search for more, and scenting the feast within the vessel they will plunge to their doom one after the other. As many as thirty-eight rats have been caught this way during a single night. Rats can swim, of course, but with the surface of the water within the barrel about a foot from the top they are unable to jump out and soon drown.—"Farmers' Advocate" (South Africa).

Orchard Notes for October.

THE COASTAL DISTRICTS.

OCTOBER is frequently a dry month over the greater part of Queensland, consequently the advice that has been given in the notes for August and September regarding the necessity of thorough cultivation to retain moisture is again emphasised. Unless there is an adequate supply of moisture in the soil to meet the trees' requirements, the coming season's crop will be jeopardised, as the young fruit will fail to set.

Thorough cultivation of all orchards, vineyards, and plantations is therefore imperative if the weather is dry, as the soil must be kept in a state of perfect tilth, and no weeds of any kind must be allowed to grow, as they only act as pumps to draw out the moisture from the soil that is required by the trees or fruit-yielding plants. Should the trees show the slightest sign of the want of moisture, they should be given a thorough irrigation if there is any available means of doing so, as it is unwise to allow any fruit trees to suffer for want of water if there is a possibility of their being supplied. Intermittent growth, resulting from the tree or plant being well supplied with moisture at one time and starved at another, results in serious damage, as the vitality is lessened and the tree or plant is not so well able to ward off disease. A strong, healthy, vigorous tree is frequently able to resist disease, whereas when it has become debilitated through neglect, lack of moisture or plant food, it becomes an easy prey to many pests. If an irrigation is given, see that it is a good one and that the ground is soaked; a mere surface watering is often more or less injurious, as it is apt to encourage a false growth which will not last, and also to bring the feeding roots to the surface, where they are not required, as they only die out with a dry spell and are in the way of cultivation. Irrigation should always be followed by cultivation, so as to prevent surface evaporation and thus retain the moisture in the soil.

All newly planted trees should be carefully attended to, and if they show the slightest sign of scale insects or other pests they should receive attention at once. All growth not necessary to form the future tree should be removed, such as any growths on the main stem or main branches that are not required, as if this is done now it will not only save work later on, but will tend to throw the whole strength of the tree into the production of those limbs that will form the permanent framework of the tree. In older trees all water sprouts or other similar unnecessary growths should be removed.

Keep a good lookout for scales hatching out, and treat them before they have become firmly established and are coated with their protective covering, as they are very easily killed in their early stages, and consequently much weaker sprays can be used. The best remedies to use for young scales hatching out are those that kill the insects by coming in contact with them, such as miscible oils, which can be applied at a strength of 1 part of oil in 40 parts of spraying material, and will do more good than a winter spray of double the strength. In the use of miscible oils or kerosene emulsion, always follow the directions given for the use of those spraying materials, and never apply them to evergreen trees when they are showing signs of distress resulting from a lack of moisture in the soil, as they are then likely to injure the tree, whereas if the tree is in vigorous growth they will do no harm whatever.

All leaf-eating insects should be kept in check by the use of an arsenate of lead spray, taking care to apply it as soon as the damage appears, and not to wait till the crop is ruined. Crops, such as all kinds of cucurbitaceous plants, tomatoes, and potatoes are often seriously injured by these insects, and the loss occasioned thereby can be prevented by spraying in time. In the case of tomatoes and potatoes, a combined spray of Bordeaux or Burgundy mixture and arsenate of lead should be used, as it will serve the dual purpose of destroying leaf-eating insects and of protecting the plants from the attack of Irish blight.

Grape vines require careful attention, and, if not already sprayed with Bordeaux mixture, no time should be lost in applying this material, as the only reliable method of checking such disease as anthracnose or black spot and downy mildew is to protect the wood and foliage from the attack of these diseases by providing a spray covering that will destroy any spores that may come in contact with them. The planting of bananas and pineapples can be continued during this month. See that the land is properly prepared and that good, healthy suckers only are used. Keep

the plantations well worked, and allow no weed growth. Keep a very careful lookout for fruit flies; destroy every mature insect you can, and gather and destroy every fallen fruit. If this is done systematically by all growers early in the season the subsequent crop of flies will be very materially decreased. See that all fruit sent to market during the month is carefully handled, properly graded, and well packed—not topped, but that the sample right through the case or lot is the same as that of the exposed surface.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Much of the matter contained under the heading of "The Coastal Districts" applies equally to these parts of the State; for on the spring treatment that the orchard and vineyard receives the succeeding crop of fruit is very largely dependent. All orchards and vineyards must be kept in a state of perfect tilth, and no weed growth of any kind should be allowed. In the Western districts, irrigation should be given whenever necessary, but growers should not depend on irrigation alone, but should combine it with the thorough cultivation of the land so as to form and keep a fine soil mulch that will prevent surface evaporation.

All newly planted trees should be carefully looked after, and only permitted to grow the branches required to form the future tree. All others should be removed as soon as they make their appearance. If there is any sign of woolly aphis, peach aphis, or scale insects, or of any fungus diseases on the young trees, these diseases should be dealt with at once by the use of such remedies as black leaf forty, Bordeaux mixture, or a weak oil emulsion. In older trees, similar pests should be systematically fought, as if kept in check at the beginning of the season the crop of fruit will not suffer to any appreciable extent. Where brown rot has been present in previous years, two or more sprayings with Bordeaux mixture can be tried, as they will tend to check other fungus growths, but at the same time the sodium or potassium sulphide sprays are more effectual for this particular disease and should be used in preference when the fruit is nearly full grown. All pear, apple, and quince trees should be sprayed with arsenate of lead—first when the blossom is falling, and at intervals of about three weeks. Spraying for codlin moth is compulsory in the fruit district of Stanthorpe, and wherever pomaceous fruit is grown it must be attended to if this insect is to be kept in check.

In the warmer parts a careful check should be kept for any appearance of the fruit fly, and, should it be found, every effort should be made to trap the mature insect and to gather and destroy any affected fruit. If this is done, there is a good chance of saving the earlier ripening summer fruit, if not the bulk of the crop. Tomato and potato crops will require spraying with Bordeaux mixture, as also will grape vines. Keep a very strict watch on all grape vines, and, if they have not already been treated, don't delay a day in spraying if any sign of an oil spot, the first indication of downy mildew, appears on the top surface of the leaf. Spraying with Bordeaux mixture at once, and following the first spraying up with subsequent sprayings, if necessary, will save the crop, but if this is not done and the season is favourable for the development of the particular fungus causing this disease, growers can rest assured that their grape crop won't take long to harvest.

Where new vineyards have been planted, spraying is also very necessary, as if this is not done the young leaves and growth are apt to be so badly affected that the plant dies.

Farm Notes for October.

Field.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore, our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, cowpeas, sorghums, millet, panicums, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants from preparing the ground to harvesting the crop, to which our readers are referred.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	September, 1931.		October, 1931.		MOONRISE. Sept., 1931.	Oct., 1931.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	6.10	5.34	5.36	5.48	9.7	9.49
2	6.9	5.34	5.35	5.48	10.2	10.47
3	6.8	5.35	5.34	5.49	10.58	11.43
4	6.7	5.35	5.33	5.50	11.56	...
						a.m.
5	6.6	5.36	5.32	5.50	...	12.39
					a.m.	
6	6.5	5.36	5.31	5.51	12.54	1.39
7	6.4	5.37	5.29	5.51	1.53	2.25
8	6.3	5.37	5.28	5.52	2.50	3.7
9	6.2	5.38	5.27	5.52	3.45	3.44
10	6.0	5.38	5.26	5.53	4.32	4.20
11	5.59	5.39	5.25	5.53	5.14	4.55
12	5.58	5.39	5.24	5.54	5.50	5.30
13	5.56	5.40	5.23	5.54	6.26	6.8
14	5.55	5.40	5.22	5.55	7.2	6.50
15	5.54	5.41	5.21	5.55	7.40	7.40
16	5 53	5.41	5.20	5.56	8.16	8.37
17	5 52	5.42	5.19	5.56	9.1	9.36
18	5 51	5.42	5.18	5.57	9.52	10.37
19	5.50	5.43	5.17	5.58	10.49	11.35
						p.m.
20	5.48	5.43	5.16	5.58	11.46	12.33
					p.m.	
21	5.47	5.43	5.15	5.59	12.43	1.29
22	5.46	5.43	5.14	5.59	1.41	2.21
23	5.45	5.44	5.13	6.0	2.41	3.16
24	5.44	5.44	5.12	6.1	3.35	4.5
25	5.43	5.45	5.12	6.1	4.28	4.59
26	5.42	5.45	5.11	6.2	5.20	5.51
27	5.40	5.46	5.10	6.3	6.11	6.46
28	5.39	5.46	5.9	6.3	7.1	7.46
29	5.38	5.47	5.8	6.4	7.56	8.40
30	5.37	5.47	5.7	6.5	8.51	9.38
31	...	...	5.6	6.6		

Phases of the Moon, Occultations, &c.

5 Sept.	☽	Last Quarter	5 21 p.m.
12 „	●	New Moon	2 26 p.m.
19 „	☾	First Quarter	6 37 a.m.
27 „	○	Full Moon	5 44 a.m.

Perigee, 13th September, 3.24 a.m.
Apogee, 27th September, 12.42 p.m.

The curious coincidence of Mercury and Neptune being in conjunction with the Moon at the same hour on the 11th will be unobservable in Queensland.

Though a partial eclipse of the Sun will occur on the 12th, it will be invisible in Australia and observable only in high latitudes of North America and Asia.

At 5 o'clock in the afternoon of the 17th Mercury will be passing Neptune, but too much in the glare of the Sun to be perceptable.

On the 21st Mercury will be at its greatest distance, 18 degrees on the west side of the Sun, and will rise 49 minutes before it.

On the 24th the Sun will be passing the Equator from north to south and the equinox will occur.

About 4 o'clock in the morning of the 27th when the Moon is getting down towards the western horizon, it will be entering into the shadow of the Earth and become totally eclipsed two hours later.

Mercury will rise 7 minutes after the Sun and set 37 minutes after it on the 1st; on the 15th it will rise 49 minutes and set 51 minutes before the Sun.

Venus will be too near the Sun on the 1st and 15th to be visible.

Mars will rise at 8.9 a.m. and set at 8.43 p.m. on the 1st; on the 15th it will rise at 7.38 a.m. and set at 8.27 p.m.

Jupiter will rise at 4.43 a.m. and set at 3.27 p.m. on the 1st, on the 15th it will rise at 3.56 a.m. and set at 2.43 p.m.

Saturn will rise at 1.39 p.m. and set at 3.20 a.m. on the 1st; on the 15th it will rise at 12.38 p.m. and set at 2.21 a.m.

The Southern Cross will be at position II. at 6 p.m. on the 1st and at position III. at 8 p.m. when it will be horizontal and at its greatest distance, 30 degrees west of the celestial pole. It will disappear at Cairns about 10.15 p.m. on the 1st and reappear only when it reaches position VIII. (as on a clock face) about 6.15 a.m. At Warwick it will disappear a little before midnight and reappear about 4 a.m.

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5 Oct.	☽	Last Quarter	6 15 a.m.
11 „	●	New Moon	11 6 p.m.
20 „	☾	First Quarter	7 20 p.m.
26 „	○	Full Moon	11 34 p.m.

Perigee, 11th October, 2.30 p.m.
Apogee, 24th October, 2.54 p.m.

On the 11th of October the Sun will be partially eclipsed, but visible only in South America and some islands and a portion of the Antarctic regions. On the same day Uranus will be in opposition to the Sun—that is in the west when the Sun is in the east, and in east when the Sun is west.

A daylight view of Venus and the Moon will be obviated by their nearness to the Sun.

On the 18th October Mercury will be in superior conjunction with the Sun—that is, it will be on the farthest side of its orbit, and about 35 million miles beyond it, and would be apparently within half a degree of its surface if visible.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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